WHENCE COMES MAN

FROM "NATURE" OR FROM "GOD"?

ARTHUR J. BELL

00013463

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WHENCE COMES MAN

From 'Nature' or from 'God'?

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BY

ARTHUR JOHN BELL.

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TO

MY NEPHEW AND NIECE

WILLIAM HEWARD BELL

AND

MARY LOUISA WEDGWOOD

THIS BOOK

IS

AFFECTIONATELY INSCRIBED

BY

THE AUTHOR.

EASTON COURT,
CHAGFORD,
SOUTH DEVON.

May, 1888.

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ERRATA.

Page 17, 5 lines from bottom, *for* affectuates, *read* effectuates.
,, 61, 17 ,, ,, ,, *for* any, *read* an.
,, 66, 2 ,, ,, ,, *for* then, *read* there.
,, 81, 9 ,, ,, ,, *after* ability, insert *to*.
,, 105, 19 ,, ,, ,, the line is a quotation from Mr. Spencer.
,, 137, 6 ,, ,, ,, *for* telelogy, *read* teleology.
,, 148, 13 ,, ,, ,, *for* 310, *read* 144.
,, 163, 9 ,, ,, top, *for* effect, *read* effort.
,, 172, 3 ,, ,, bottom, *for* we, *read* it.
,, 175, 23 ,, ,, ,, *for* anything, *read* everything.
,, 182, 13 ,, ,, ,, *for* improved, *read* unproved.
,, 183, 19 ,, ,, ,, *after* conceive, *read* it as finite.
,, 237, 2 ,, ,, ,, *for* external, *read* eternal.
,, 243, 12 ,, ,, top, *for* external, *read* eternal.
,, 244, 11 ,, ,, ,, *for* affectuations, *read* effectuations.
,, 301, 21 ,, ,, bottom, *for* water, *read* matter.
,, 304, 5 ,, ,, ,, *for* compound, *read* component.
,, 310, 19 ,, ,, ,, *after* Life, *insert* dash—(no paragraphical division here). "What," commences with a small letter.
,, 317, 18 ,, ,, ,, *after* "hydrogen," *insert* are.
,, 322, 21 ,, ,, ,, *for* sus and pended, *read* suspended and.
,, 324, last bottom line, *after* results, *insert* a comma instead of a semicolon.
,, 352, 6 lines from top, *for* Infinites, *read* Finites.

"What is a man,
If his chief good and market of his time
Be but to sleep and feed? a beast, no more.
Sure he that made us with such large discourse,
Looking before, and after, gave us not
That capability and godlike reason
To fust in us unused?"

Shakespeare.

DOES MAN COME FROM "NATURE," OR FROM "GOD?"

INTRODUCTION.

"I."—

I am—I exist. But I do not exist alone. There exists besides "I" all that is not "I." To myself I am the centre of things: and what is called the Universe consists in its totality of "I" and "not—I." How did "I" come to exist? How did the "not—I" come to exist?

Does man come from Nature? Supposing that question to be answered in the affirmative, then the further question arises—Whence comes Nature? Did Nature always exist, or was there a time when it did not exist? If there were such a time, how can we account for its coming into existence?

The Theistic answer to the question—How are we to account for the existence of Man and of Nature? is, that they were alike created by an Infinite Being, to whom we give the name of God.

We know what is usually meant by the word "create," namely, that something is caused to begin to exist.

There is another word which we often unconsciously confound with the word "create," and that is, "make." That we should do so is not to be wondered at, for in "making" there seems to be a kind of "creating." For

instance, I "make" a chair. Now what goes to the "making" of a chair? I simply alter the relations and forms of certain already-existing substances—as wood, iron, wool, etc.—and arrange them in a new combination; but I do not cause these substances to "be." Yet as that particular arrangement of things, which, when completed, I call a chair, was "caused" by me, I seem to have, somehow—in a sort of way—"created" the chair. But merely to alter the relations to each other of certain already-existing substances, cannot constitute "creation."

"Creation," then, is to cause to "be;" to cause to "begin to exist." While to "make" is simply to alter the relations of certain things which already exist. No addition is made to the sum of existences.

When the Theist affirms that Nature, or the sum of things, was "created" by "God," he indirectly affirms two other things. He affirms that God must have existed before Nature, and that there was a time when Nature did not exist.

What grounds has he for making these affirmations? and what proof can he adduce of their truth?

Before we go further, it may be as well to confess that I am only an ignorant person. I do not pretend to be possessed of any deep knowledge of theology, philosophy, or science. I pretend to no more than, I hope, an average amount of common sense. Like others, I cannot help pondering a little on the problems of Nature and of Human Life; and I am much perplexed by the contradictory statements made by those who profess to explain things, and to tell me what I ought to believe, and how I ought to act; how I come to "be," and why I "be;" what is the object, or no object of my existence; what I am; whence I come, and whither I am going. One tells me Life is the gift of an infinite, all-wise, all-knowing, all-just, all-benevolent "Creator." Another, that I am the product and victim of an "unconscious" Creator who cannot help creating me, for to "create" is a

necessity of His nature; that Life, from its very nature is but another name for suffering, and that what little happiness falls to man's lot, is founded on illusions—which soon vanish, leaving only irremediable misery; that Life is a curse instead of a blessing;—which would seem to lead to the conclusion that the "unconscious Creator" must be an infinite idiot and fool. Again, on the other hand, I am informed that Life is a glorious gift of inestimable value, and calling for eternal gratitude on the part of man, seeing that it opens to him a path leading to inconceivable and everlasting happiness—though, curiously, not one in a million will attain to that happiness, but only to that which is its exact opposite—everlasting misery. Another tells me that science and philosophy show, incontrovertibly, that the idea of "Creation" is a preposterous figment, and that, on the contrary, all things have eternally existed; for we cannot point to any time when anything that exists now did not exist; or if there were such, it owed its existence to some new combination of things already existing, and, consequently, there is no need for the supposition of a Creator who "called them into existence."

When I enquire about the nature of Good and of Evil, of Right and Wrong—whether man be responsible for his actions, or not—whether this life is all—or whether there be any continuance of life in some future state,—one tells me that we are possessed of Free-will, and that consequently every one is responsible to a just and severe Judge for even the most trifling thoughts and actions; while another tells me we have no freedom at all,—that we are governed by a blind necessity, in the shape of universal and invariable law,—that we cannot be otherwise than we are—cannot do otherwise than we do,—that our character, on which our thoughts and actions necessarily depend, is made *for* us, and not *by* us; and that the height of human wisdom is to avoid as much pain, and to get out of Life as much enjoyment as possible, "to eat and drink, for to-morrow we die," and there an end,—that we should not

be so foolish as to spend our time, and strength, and money in vainly endeavouring to ameliorate the miseries of the world, in the baseless hope of an everlasting and immeasurably great recompense at the hands of an imaginary Creator,—that our fond belief in immortality is the result of the vain estimate of the human *Ego*, of its own greatness and importance—as vain as the belief of old times, that the earth was the great centre of existence, and that sun, moon, planets, and stars revolved around it, and had no other value, except in so far as they ministered to the needs of man, who was supposed to be the "lord of creation," and for whose use and pleasure they were indeed "caused to be,"—that his boasted superiority over the "beasts of the field" is a delusion, and that his only superiority over them consists in his greater capacity for suffering.

Now what are we ordinary, ignorant people to do in face of such contradictory teaching? How are we to "find out" what in them is false—what true? Who shall decide when "doctors" disagree?

I know I ought to have an encyclopædic knowledge to enable me to deal with such questions, whereas I know, as one may say—nothing. Nevertheless, it seems to me that there is a way of making, even by an ordinary person, some progress in the desired direction; and that is, to take the various statements made to us by theologists, philosophers, and scientists; and though we may not have the special knowledge which would enable us scientifically to test the correctness of the processes by which given conclusions have been reached, yet we *can* submit them to the judgment of such common sense as we may possess, and see, so far as we can, whether they corroborate and harmonise with, or contradict one another.

For instance, it does not seem so very difficult for an ordinary person like myself to understand the Atheistic objection to the Theistic affirmation of the existence of an Infinite Theos, by whom all things were "created"—namely,

that we cannot go back to any time when the things which now exist, did not exist. Matter and force, governed by invariable laws, have—so far as we know—always existed, and are sufficient to account for all phenomena. Unless you can point to a time when all of them, or some of them, or even one of them did not exist, there is no need for the supposition of a "Creator"—for why should we invent a Creator to account for that which accounts for itself?

The Agnostic says, "I do not assert that matter and force are from eternity. I have not the data which would justify such an assertion; but I *do* say that I have no reason for thinking that they did not eternally exist. Unless you can show me, with a reasonable amount of certainty, a time when they did not exist; or at any rate, something now existing which did not then exist, and whose existence cannot be accounted for by some action or combination of things which seem always to have existed, I cannot accept the dictum of the Theist,—that all things owe their existence to what he is pleased to call "the Infinite God."

Now I have not, myself, the necessary knowledge which would enable me to give the Theistic reply to these objections. But there are books which profess to do so, and also books which maintain the postulates of the Agnostic. There are the works of Dr. Flint, Mr. Herbert Spencer, Mr. John Stuart Mill, Professor Tyndall, Dr. Sterry Hunt, Professor Huxley, Professor Michael Foster, Professor Tait, Professor Allman, Professor Clerk-Maxwell, Mr. Darwin, and others. We can enquire what they say, and then judge what they advance, to the best of our ability, which may not be great, but it certainly can be—just, at least so far as our imperfections may permit; and whatever may be the result, I am sure I shall have the sympathy of my brothers and sisters in ignorance—and we constitute a tolerably large family.

Suppose we consult the book "Theism." By the Rev. Robert Flint, D.D., LL.D., F.R.S.E., Professor of Divinity

in the University of Edinburgh, author of the "Philosophy of History in Europe," etc. (fifth edition, revised, 1886).

The high position of the writer, his great reputation, the recency of the publication of his book, and the significant fact of its having reached a fifth edition—all lead us to infer that in his work we are likely to find the defence of Theism in its most perfected form, and set forth as powerfully and clearly as it can be.

NOTE.—Unless otherwise specified, all words in italics have been italicised by the present writer.

—All parentheses inserted by the present writer in any quotation are indicated by their being enclosed in square brackets. [ ]

Henry W. de B. Pascoe

CHAPTER I.

THE NATURE AND ORIGIN OF THINGS.

THE AGNOSTIC OPINION, BY EVOLUTION; THE THEISTIC OPINION, BY CREATION; DR. FLINT'S ARGUMENTS FOR—CAUSATION THE RESULT OF CONFLICTS OF UNEQUAL FORCES — "CREATIONAL" CAUSATION — "CHANGAL" CAUSATION — THAT THINGS BEGAN TO BE — "FORMATIONS" NOT "CREATIONS"—CRITICISES MILL —A SUPREME INTELLIGENCE NEEDED TO ACCOUNT FOR "ORDER AND DESIGN."

WHEN we ask the question—Whence comes man? two answers are offered to us. That of the Atheist or the Agnostic, and that of the Theist.

The Agnostic answer is—That man is the result of a long process of evolution. The postulate of evolution, as set forth by Mr. Huxley, is—"That the whole world, living and not living, is the result of the mutual interaction, according to definite laws, of the forces possessed by the molecules of which the primitive nebulosity was composed."

But the "primitive nebulosity!" Had it a beginning? How is its existence accounted for?

The Agnostic affirms that the "primitive nebulosity" consisted of a mass of atoms, and that, probably, it had previously existed in other forms than that of a "nebulosity;" but that in some form or other its component atoms must always have existed, for according to experience and science, the coming into existence of anything, or the going out of existence of anything, are alike inconceivable.

Of Theism, and its answer to the question—Whence comes man? Dr. Flint writes:—

Page 18.—"Theism is the doctrine that the universe [and of course all contained in it] owes its existence, and continuance in existence, to the Reason and Will of a

self-existent Being, who is infinitely powerful and good. It is the doctrine that Nature has a 'Creator' and Preserver, the nations a Governor, men a heavenly Father and Judge."

At page 1.—"Is belief in God a reasonable belief, or is it not? Have we sufficient evidence for thinking that there is a self-existent Being, infinite in power and wisdom, and perfect in holiness and goodness, the maker of heaven and earth, or have we not? Is Theism true, or is some antagonistic theory true? This is the question which we have to discuss and answer."

At page 58, Dr. Flint writes:—" . . . That the actual and the ideal meet and harmonise in God, who is at once the First and the Final Cause, the Absolute Idea, the Highest Good."

Speaking of the nature, limits, and conditions of Theistic proof, he says:—

Page 59.—"If we believe that there is one God—the Creator, Preserver, and Ruler of all finite beings—we ought to have reasons or grounds for this belief. We can have no right to "believe" it simply because we wish, or will, to believe it. The grounds or reasons which we have for our belief must be to us *proofs of God's existence.*"

At page 60.—"The proofs of God's existence must be, in fact, simply His own manifestations; the ways in which He makes Himself known; the phenomena on which His power and character are imprinted."

At page 62.—" All those facts which cannot be reasonably conceived of as other than the manifestations of God—His glory in the heavens, His handiwork on the earth, His operations in the soul, His ways among the nations . . . they are to be found in all the forces, laws, and arrangements of Nature—in every material object, every organism, every intellect and heart. At the same time they concur and coalesce into a single all-comprehensive argument, which is just the sum of the indications of God given by the physical universe, the minds of men, and human history."

At page 79.—"Our entire spiritual being is constituted for the apprehension of God in and through His works. All the essential principles of mental action, when applied to the meditative consideration of finite things, lead up from them to infinite creative wisdom. The whole of nature external to us is a revelation of God; the whole nature within us has been made for the reception and interpretation of that revelation."

At page 96.—"*Nature is but the name for an effect whose cause is God.*"

The last sentence is a clear and distinct affirmation, which, if supported by adequate evidence, would, as it seems to me, establish the existence of God in the only way in which it seems possible to establish it. For what we call "Nature" can be accounted for in but two ways. Either it always existed, or it owes its existence to something competent to create it; meaning by "creation" the causing to begin to exist, to begin to be. It is of no use to appeal to the power, the wisdom, the goodness, the infinity, the absolutity—I am obliged to coin a word, for "absolute" is a "quality," not a "thing"—of a supposed Being as a proof of the "existence" of that Being. Before we can make any assertions respecting the character or powers or qualities of any being, we must be satisfied that such a being exists; and at the present moment, *that*—respecting which we wish to reach a satisfactory judgment—is the "existence," not the "attributes," of God.

Dr. Flint affirms that "Nature," the sum of things, is not original—eternal—but is derived, is an effect—has been caused, and consequently there was a time when Nature did not exist. And, consequently also, that Nature must be "external" to that which created it.

If Dr. Flint be right, we must, instead of recognising only one kind of "causation," recognise two. The one kind—the kind with which we are all acquainted—is that kind of causation which pervades, or is present, in all Nature, and to which I have previously referred. The totality of things is supposed to consist of two kinds of entities, or of one kind of

entity which exhibits itself in various ways. They are not always described in the same terms. By some they are called "matter" and "force;" by some, "matter" and "motion;" by some, "matter" and "motion" and "force." I prefer, myself, to call them "matter" and "force," or more properly, "matters (or bodies)" and their "forces." If I sometimes call them "matter" and "force," I shall—unless I otherwise specify—mean "bodies" and their "force." Of course there is no such "thing" as "motion," motion being simply a "state" of a body, the cause of the state being some force acting upon or in the body—and motion, therefore, cannot be transferred from one body to another body; if we supposed it could, we should suppose that the state of one body could become the state of another body—which is absurd. When a body by the action upon it, or in it, of some force is caused to be in the state of motion or moving, its rate of motion will be proportionate to its ability to resist such action upon it. If its power of resisting be great in proportion to the impressed force, the motion will be slow; if small, it will be more rapid. If a moving billiard ball strike another billiard ball at rest, the result will be the motion of the latter, and diminution of the rate of motion of the former. It is usually said that the decrease in the rate of motion of the first billiard ball is to be accounted for by its having transferred a portion of its "motion" to the second billiard ball, and that the motion of the second billiard ball is accounted for by such "transfer" of motion. I think it is clear that such is not the fact, but that the cause of the diminution of the rate of motion of the striking ball is consequent upon the communication of a part, not of its motion, but of a portion of its force, to the ball which it has struck, and that the motion of the latter ball is consequent upon the force which has been so communicated; for, as I said before, motion is but a state of a body, and how can one body communicate its state to another body? It cannot do so, but it *can* communicate to another body a portion of that by which it was itself put into a state of motion—namely, force.

No body can ever be in the state of another body, but one body can be in a *like* state to another body when acted upon by a *like* cause.

"Cause."—What is "cause?" and what is "effect?"

The subject of our present consideration being Dr. Flint's postulate that "Nature is but the name for an 'effect' whose 'cause' is God," it is necessary—if our judgment of that statement is to be correct—to have a very clear conception of the meaning of the words "cause" and "effect."

According to physical science, the universe consists of matter and force, existing in space—in other words, of a sum of atoms, and the forces inherent in those atoms. These atoms and forces have, so far as we know or can judge, existed eternally. Their relations to one another are continually changing. The "causes" of such changes are the interactions of the atoms upon one another. The causes of the "interactions" are the forces inherent in the various atoms; the "effects" of the interactions are the changes of relation of the atoms to one another.

The words "interaction of the forces inherent in the atoms" imply that these forces conflict with one another, the result of such conflict being some "change" in their relations to one another—changes of aggregation—changes of separation—changes of position—changes of rates of motion —changes from motion to rest—changes from rest to motion.

May we then define "cause?"—but here it is to be noted that there is the same objection to the word "cause" as there is to the word "motion." We have seen that motion is not a "thing" or "entity," but a "state." In the same way "cause" is not a thing or entity, but an "action." It ought not to be "cause," but "causation" "caused" by a "caus-*er*," who affectuates or "causes" an "effect." When we speak of the "cause" of an effect, we really mean the "caus-*er*" of the effect. The word "effect" is correct enough, for it quite clearly expresses the result or change "effected" by the action of the "causer."

May we then define "cause," or "causation," to be a *conflict of forces*—of the forces inherent in the atoms; and effect, or effectuation, to be *the resulting "changes" in the relations to one another of the atoms and their forces?* I think we may.

It is to be carefully noted that the results of causation are merely "changes," and nothing more. No matter how great or how numerous those changes or effects may be—from the primal state of nebulous matter to the world as it now presents itself to us—no *addition* of any kind whatever is made to the sum of matter and force. The only changes are changes of "relations." To quote again the words of Mr. Huxley, "The whole world, living and not living, is the result of the mutual interaction, according to definite laws, of the forces possessed by the molecules of which the primitive nebulosity was composed."

But the "causation"—the mode or process of which I have endeavoured rightly to analyse—is not the "kind" of "causation" which Dr. Flint has in his mind when he says that "Nature is but the name for an 'effect' whose 'cause' is God," but that kind of causation of which we continually have experience, and which does no more than effect "changes" in the "states" and relations of the matter and force amidst which we live. He says, "That the universe owes its *existence*, and continuance in existence, to . . . a self-existent Being . . . that Nature has a Creator and Preserver;" so that when he says, as above, that "Nature is but the name for an 'effect' whose 'cause' is God," he means by "cause" something very different to what we understood by the word "cause," when we considered its meaning in relation merely to changes produced by "conflicting forces" in the dispositions and relations and states of bodies already existing. He meant a *creative* cause—that is, that the atoms and forces whose mere "changes" we considered, He "caused" to "be," to "exist;" that He—as it is termed—"created" them.

There are, then, according to Dr. Flint, two kinds of causation: the one of which can do no more than cause "changes"

in the relations to one another of matters and forces already existing; the other, "creative" cause, or that which causes "existences" themselves. We have continuous, life-long, universal experience of the former kind of causation. Have we any experience at all of the latter? And why should the Theist suppose that there is such a "creational cause" as he asserts? Is the supposition one which is necessary, or is it entirely superfluous? And what evidence can be adduced in its support? The kind of causation of which we have knowledge I shall call "*changal causation.*" The other kind I shall call "creative," or "creational causation."

A preliminary remark may here be made.

It is often asserted, that even supposing you are able to prove, to your own satisfaction, that the universe owes its existence to a "first cause," you are no nearer to any satisfactory conclusion; because you will still have to account for that first cause; and supposing you to succeed in so doing, you will still have to account for that cause of the first cause; and then the cause of the cause of the first cause, or what you are pleased to call the first cause, and so on. *ad infinitum.*

I think this criticism is entirely destitute of validity. It is absolutely impossible to avoid perceiving that there must—as we cannot imagine anything "creating" itself—that there *must be something which has eternally existed;* "something" which has *not been "creationally" caused, but is self-existent,* and therefore necessarily eternal, and our present enquiry is—Has the totality of matter and force, which we call the universe or Nature, eternally existed, or has it not eternally existed? If it has always existed, it has not been created. Therefore, no Causer or Creator is needed. If it had a beginning—no matter at how remote a period—it must have been "creationally" caused, and therefore there must exist some Being who creationally caused it. Our desire is to ascertain, if possible, which of these assertions is correct.

Dr. Flint and all Theists affirm that the *eternal something*

is God, and that all things owe their existence to Him. Of course, Dr. Flint must give us sufficient proof that things had a beginning, and owe that beginning to God.

The proof of the existence of God which we should be most inclined to accept would be—that the matter and force constituting the universe *had a beginning*, and so could not be supposed to exist without having been created; but the words "would be inclined to accept," very inadequately express the effect such a proof would produce upon myself. I should feel *compelled* to believe in the existence of God. But it is not a proof of the "beginning to exist" of the *whole* universe that I ask for or need, for a single instance would be sufficient. If any beginning of any existence whatever—no matter how minute—could be adequately proved, it would *compel* belief in God. We should have no choice, *for a thing cannot create itself.*

If, then, we are to believe in God, we must find some existence in which we can perceive, either directly or indirectly or by unavoidable inference, an absolutely distinct "beginning to exist."

I hope our previous consideration of the process of causation and effectuation will prevent us from mistaking any mere change or changes of "relations" amongst already-existing substances and forces—any act of mere "changal causation" for an act of "creational causation."

Can Dr. Flint help us to discover "creation?" The only way in which it seems possible to do this is to show us some commencement not of "changes," but of "existence."

As the sum of things is supposed to consist of matter and force, any instance of a commencing existence must be one of these two—a matter, or a force.

As our best chance of discovering a commencing existence, is likeliest to be met with amongst things of which we have the most extensive knowledge; and as all the celestial bodies seem to be in many respects similar to the bodies

composing our own solar system, it will probably be to our advantage to, at present, limit the area of our enquiries to the matter and force composing that system, and more especially to the member of that system on which we live—the earth; and in relation to absolute commencement we very naturally propound the question—Had the substances of which our own system is composed a "beginning," or not?

Dr. Flint says (page 18):—"Theism is the doctrine that the universe owes its existence, and continuance in existence, to the Reason and Will of a self-existent Being who is infinitely powerful, wise, and good. It is the doctrine that Nature has a Creator and Preserver, the nations a Governor, men a heavenly Father and Judge."

For reasons sufficiently obvious—namely, that it would be foolish to consider the nature and character of a being, until we have quite satisfied ourselves that such a being exists, we will confine ourselves to a consideration of the evidence to be adduced by Dr. Flint in support of one only of these statements—that "Nature has a Creator."

Page 98, he says:—"When we assume the principle of causality in the argument for the existence of God, what precisely is it that we assume? Only this: that whatever has begun to be, must have had an antecedent, or ground, or cause, which accounts for it. We do not assume that every existence must have had a cause. We have no right, indeed, to assume that any existence has had a cause, until we have found reason to regard it as not an eternal existence, but one which has had an origin. Whatever we believe, however, to have had an origin, we at once believe also to have had a cause."

Page 101.—"If every event—using this term as convenient to denote either a new existence, or a change in some existence—must have a cause, to prove that the universe must have had a cause, we require to prove it to have been an event—*to have had a commencement.* Can this

be done? That is *the* [Dr. Flint's italics] question in the Theistic argument from causality."

I think we may safely say that Dr. Flint here states his case with admirable fairness, but, unfortunately, Dr. Flint—as it seems to me—classes as like each other, if not as practically identical, two things which are in one respect totally different. He makes no clear distinction between a "new existence" and "a change" in something already in existence! Now a "new existence" involves causation, and a "change in something already existing" also involves causation. And as they both thus involve causation, Dr. Flint treats of them as if their causation were exactly alike; whereas, a "new existence" involves "creational" causation—that is, an *addition* to the sum of existence; while a "change in something already in existence" involves only "changal" causation! As we have, I hope, seen, our whole life long is one continuous experience of "changal" causation, but of "creational" causation we seem to know of no instance whatever. The very existence of "creative" causation is that of which we are seeking proof. From the confusion of the two kinds of causation, creative and changal, noticed above, I should be inclined to expect that in all probability Dr. Flint will think he has adduced proofs of "creational" causation, which will turn out to be useless instances of merely "changal" causation.

The paragraph from which I quote continues as follows:—

"Compared therewith [the necessity of proving that the universe had a commencement], all other questions which have been introduced into, or associated with, the argument are of very subordinate importance. Now there is only one way of reasonably answering the question, and that is by examining the universe in order to determine whether or not it bears the marks of being an event—whether or not it has the character of an effect. We have no right to *assume* [Dr. Flint's italics] it to be an event, or to have had a

beginning. The entire argument for the Divine existence, which is at present under consideration, can be no stronger than the strength of the proof which we can adduce in favour of its having had a beginning, and the only valid proof of that, which reason can hope to find, must be derived from the examination of the universe itself.

"What, then, is the result of such an examination? An absolute certainty that all the things which are seen are temporal—that every object in the universe which presents itself to the senses has had a beginning,—that the most powerful, penetrating, and delicate instruments devised to assist our senses reach no cause which is not obviously also an effect. The progress of science has not more convincingly and completely disproved the once prevalent notion that the universe was created about six thousand years ago, than it has convincingly and completely established that everything of which our senses inform us, has had a commencement in time, and is of a compound, derivative, and dependent nature.

"It is not long since men had no means of proving that the rocks, for example, were not as old as the earth itself—no direct means of proving even that they were not eternal; but geological science is now able to tell us, with confidence, under what conditions, in what order, and in what epochs of time they were *'formed.'* We have, probably, a more satisfactory knowledge of the *'formation'* of the coal measures than of the establishment of the feudal system. We know that the Alps, although they look as if they might have stood for ever, are not old, as geologists count age. The morning and the night, the origin and disappearance of the countless species of living things which have peopled the earth from the enormously remote times when the rocks of the Laurentian period were deposited, down to the births and deaths of contemporaneous animals, have been again brought into the light of day by the power of science. The limits of research are not even there reached, and with

bold flight science passes beyond the confines of discovered life—beyond the epochs of '*formation*' of even the oldest rocks—to a time when there was no distinction of earth and sea and atmosphere, as all were mixed together in nebulous matter, in some sort of fluid or mist or steam; yea, onwards to a time when our earth had no separate existence, and suns, moons, and stars were not yet divided and arranged into systems. If we seek, then, after what is eternal, science tells us that it is not the earth, nor anything that it contains, nor the sea, nor the living things within it, nor the moving air, nor the sun, nor the moon, nor the stars. These things when interrogated all tell us to look above and beyond them, for although they may have begun to be, in times far remote, yet it was within times to which the thoughts of finite beings can reach back.

"There is no denying, then, that the universe is to a *great extent an effect*, an event, something which has begun to be, a process of becoming. Science is, day by day, year by year, finding out more and more that it is an *effect*."

I am afraid it must be confessed that Dr. Flint—as I feared he would—has mistaken "*changal causation*" for "*creational causation*." And if the universe is not entirely, but only to a "great extent," to be considered "an event, an effect," it necessarily follows that that part of the universe which cannot be so considered must have eternally existed.

What we call the "matter" of Nature consists of bodies. These "bodies," rightly or wrongly—whether rightly or wrongly is immaterial—are said to be composed of atoms, either single, or combined or aggregated into molecules or particles.

What we call the force existing in Nature, is the sum of ability possessed by these atoms to cause changes in themselves as individuals and as portions of masses, or upon other atoms as individuals or as masses. When Dr. Flint says above, "with bold flight, science passes beyond the confines of discovered life—beyond the epochs of

'formation' even of the oldest rocks—to a time when there was no distinction of earth and sea and atmosphere, *as all were mingled together in nebulous matter, in some sort of fluid or mist or steam*"—does he indicate anything but "*changal causation?*" The matter and force are all that are referred to. He does not even hint that science has ever been able to go beyond that "nebulous matter"—that "fluid or mist or steam," or that it supposes such "nebulous matter" owed its existence to "*creative causation!*" Is there the smallest reason to suppose that that "nebulous matter"—that "mist or fluid or steam," that inconceivable immense mass of atoms, more or less separate, more or less joined together in larger or smaller masses, ever had a "beginning?" Dr. Flint speaks of science. Well, the universal opinion of science is that matter is indestructible, and what reason is there to suppose that it ever had a beginning—that it ever commenced to exist. We have always had experience of matter as existing, we have had no experience of its beginning to exist or of its ceasing to exist. All our experience of it consists in an experience of its changes, such "changes" being the effect of "conflicts" amongst its forces. The gradual solidification of the "nebulous matter," from a state of "fluid or mist or steam," into what we know as the solar system; the condensation of the elemental atoms into the solid crust of our earth as it cooled, and as it was acted upon by its own gravity and by the action of the forces possessed by the atoms of which its mass was composed; the "formation" of rock and mountains, and all the wonders which are disclosed to us by the science of geology—indeed of all the sciences;—what are they all but manifestations of "*changal causation?*" Is there any, even the smallest sign of "*creative causation?*" And yet, in the first sentence of the next paragraph (page 103), Dr. Flint says, "There is no denying then ["then!"] that the universe is to a great extent an effect, an event, something which has begun to be."

Certainly it is an "effect," but it is not a "*creational effect.*" When Dr. Flint says, "that the universe is to a 'great extent' an 'effect,' an 'event,' something which has 'begun to be'—a 'process of becoming,'" there lies hidden a serious ambiguity. If by "universe" is meant merely that particular relationship of position of every atom to every other atom which resulted from their mutual interaction during the change from the confused, incoherent state of a "nebulous matter"—or "fluid" —or "mist"—or "steam"—to that more or less consolidated state of which we have knowledge, and which is specially observable in the "solar system"—then the universe is *not* merely to a "great extent" an effect or event, but is entirely, wholly an effect; but it is only a "changal" effect, not a "creational" effect, and is entirely useless for Dr. Flint's purpose. If Dr. Flint intends us to believe that his references to the universe shall be understood by the reader to mean that the universe "begins" to be, I think he will most certainly be disappointed. Dr. Flint begins with the nebula *already existing.* We have no sign of "creation," but only a "changal effect," and the only thing that has "begun to be" is a "change" in the relations of the totality of the sum of atoms which composed the "nebulous matter" into the solar system. But in that solar system we have no reason to suppose there has been *added* a single new atom or the most infinitesimal amount of new force. Atoms and forces are what they were when we first made acquaintance with them. Atoms and forces they are now—no more and no less.

But it may be objected—How do you know that when we first made "acquaintance" with the atoms and their forces as the "nebulous mist," that they had not just then been created? Do you suppose that they could make themselves, and with the forces which you allow them to possess? And how do you know that they then possessed all the powers they possess now? And how can you possibly account for their existence at all?

To which it is to be replied—I do not "account" for their existence at all. They exist, and, so far as we know, they have always existed, for we can find no evidence whatever of their beginning to exist, and that for which we can find no beginning to exist, *does not, for that very reason, need to be accounted for*. They account for themselves. It is only for *a beginning to exist* that we are called upon to "account."

But until I have had presented to me some satisfactory reasons for believing that there was a time when they did not exist, I must, perforce—for it is not a matter of choice—continue to believe in their eternal existence. As yet, Dr. Flint has given no reason at all. All the instances he has adduced are merely instances of "*changal* causation," not of "creational causation," and so are entirely futile. All he has said is, that the matter of the universe has passed from a chaotic "nebula" to a "formed" state. He never made any assertion at all respecting the non-eternity of the matter of the nebula, and yet writes:—

Page 103.—"The growth of science is in great part merely the extension of the proof that the universe is an effect [that is, a "*changal effect*," an effect which can be accounted for by the interactions of the matters and forces composing the universe], but the scientific proof of the non-eternity of matter is as yet far from complete. [Have we had one single atom of proof yet? not one!] It leaves it possible for the mind to refer to the phases through which the universe has passed, and the forms which it has assumed, to an underlying eternal source in Nature itself, and not to God. And this is by far the most plausible and forcible way of combating the argument we are employing. It meets it with a direct counter-argument which every person must acknowledge to be relevant, and which, if sufficiently made out, is obviously decisive. That counter-argument we are bound therefore to dispose of."

We have already estimated the value of Dr. Flint's previous argument, which did not touch this question at all.

Let us see how he meets this "counter-argument" of the "eternity of matter," and whether he will succeed in "disposing of it."

He proceeds (page 104):—"It has been thus stated by Mr. J. S. Mill, 'There is in Nature a *permanent element*, and *also a changeable:* the changes are always the effects of previous changes; the permanent existences, so far as we know, are not effects at all. It is true we are accustomed to say not only of events, but of objects, that they are produced by causes, as water by the union of hydrogen and oxygen. But by this we only mean that when they begin to exist, their beginning is the effect of a cause. But their beginning to exist is not an object, it is an event. . . . But that which in an object begins to exist, is that, in it, which belongs to the changeable element in Nature; the outward form and the properties depending on mechanical or chemical combinations of its component parts. There is in every object another and a permanent element—viz., the specific elementary substance or substances of which it consists, and their inherent properties [that is, the matter and its forces]. These are not known to us as beginning to exist. Within the range of human knowledge they had no beginning, and consequently no cause: though they themselves are causes or con-causes of everything that takes place. Experience, therefore, affords no evidences, not even analogies, to justify our extending to the apparently immutable a generalisation grounded only on our observation of the changeable.'"

Which simply means that, as we have no reason to suppose the "permanent elements" of matter and force had a beginning, there can be no need to suppose a Creator to account for them; and that all the "*causation*" *and* "*effectuation*" of which we have had experience are only "*changal.*" But I think Mr. Mill's mode of statement is somewhat ambiguous. He speaks of "two elements," one permanent and the other changeable. But "changeability" is not an "element," it is only a possibility of changes of the states of things and

bodies. When he speaks of the "element" of changeability, I think he somewhat mixed up "force," which is the "cause" of change, and "change," which is the "effect" of force. In the instance of changeability which he adduces, the union of hydrogen and oxygen to form water, he omits the *cause* of the change—viz., the action of the electric spark; thus wholly ignoring the existence of the force by the action of which the change was effected. From his point of view there are only two elements—the permanent matter and the changeability, whereas, although it is true that there are "two" permanent elements, they are not "matter" and "changeability," but "matter" and "force," by the action of which there results the effect or change. In the last of the sentences quoted from Mr. Mill, Mr. Mill uses a word which, I think, is misleading. He says, "Experience, therefore, affords no evidences, not even analogies, to justify our extending to the apparently immutable a generalisation grounded only on our observation of the changeable." The word, instead of being "immutable," should, I submit, have been "eternal"—indestructible—for it refers to the "permanent element" which is not known to us as beginning to exist, especially as the "permanent element" really refers to force as well as matter. Dr. Flint avoids the proper issue —the eternity of matter and force—and replies upon the word "immutable."

At page 103, Dr. Flint says:—"On this I would remark, first, that mere experience [why should the word "mere" be disparagingly applied to "experience?" "Experience" is, in some form or other, the sole source of our knowledge. To the man who believes in a Divine revelation, what is that Divine revelation but a human "experience?" Should it be described as a "mere" experience?]—mere experience does not take us to anything which we are entitled to call even 'apparently immutable.' It only takes us, even when extended to the utmost by scientific instruments and processes, to elements which we call simple because we have hitherto

failed to analyse them into simpler elements. It is a perfectly legitimate hypothesis, that all the substances recognised by chemists as elementary and instransmutable are in reality the modifications or syntheses of a single material element, which have been produced under conditions that render them incapable of being affected by any tests or agencies which the analyst in his laboratory can bring to bear upon them. . . . But suppose the so-called elementary substances of chemistry to be simple, no one can reasonably suppose them to be known to us as ultimate. . . . No man has seen, heard, touched, or tasted an ultimate atom of any kind of matter. We know nothing of atoms—nothing of what is permanent in Nature—from direct experience. We must pass beyond such experience—beyond all testimony of the senses—when we believe in anything permanent in Nature, not less than when we believe in something beyond and above Nature."

I do not think the foregoing can be considered an argument at all. We have no experience of any commencement of matter. Dr. Flint seems to think that if you took a piece large enough to be visible and broke it, or in some way divided it till the bits were so small as to be invisible, nay, to separate its components into bits so small that twenty millions of them put together would not be visible, such "change" would amount to a proof that it had not always existed, which is somewhat curious reasoning. It is not the size or the ultimacy of the atoms of matter that touches the question, but whether we can discover a beginning of their existence; but of such beginning Dr. Flint has, as yet, adduced no evidence whatever. The only "experiences" he has specified, are experiences of "*changal causation*," not of "*creational causation*." I think Dr. Flint must himself have some doubts about the cogency of his last argument, for he commences the next paragraph, (page 106), thus:—

"Then, secondly, although we grant that there is a 'permanent element' in the physical universe, *something in matter*.

itself which is 'self-existent' and 'eternal,' we still need, in order to account for the universe which we know, an Eternal Intelligence. The universe . . . cannot be explained, as materialists think, merely physically."

How is this passage to be understood? Do the words, "although we grant that there is a *'permanent element'* in the physical universe, something in matter itself which is *'self-existent' and 'eternal'*" mean that Dr. Flint gives up his argument that matter had a beginning, or not? It seems to me that the only interpretation we can put upon his words is, that he does allow that his argument that matter had a beginning cannot be maintained. If his words had been something to the effect that, "although we were to grant—which, however, we do not grant—that there is a 'permanent' element in the physical universe, 'something in matter itself which is self-existent and eternal,' we still need, in order to account for the 'formed' universe which we know, an Eternal Intelligence,"—there could have been no doubt on the subject. But taking the words as he has written them, I cannot understand them to mean anything but that he finds his argument for the non-eternity of matter and force must be given up. Unless I find something in his further statements to repudiate such a construction, I must continue to hold that Dr. Flint owns himself to be unsuccessful, and is obliged to have recourse to the argument from "design"—that is, that the wonderful "order" which is to be observed in the relations of portions of matter to the other portions of matter cannot be accounted for by anything in matter itself, and are only to be accounted for by the action of some "Supreme Intelligence" to whom such "order" is due.

It is, however, very curious to notice that Dr. Flint has, up to the present, spoken of "matter," as if the single word matter expressed all that we had to consider. He has wholly ignored *force*. It is quite certain that if all we had to do with was merely matter, matter, as it is thought of by many

people, as something inert and motionless, incapable of change except such change as arose out of and from external causes, matter alone, could not account for "changal causation," whereas the fact is that we may say that absolute rest, absolute motionlessness is not to be found, so far as we know, anywhere in the entire universe. The result of the action of the forces inherent in matter has been the states of things as we now know them. Gravity, chemical attractions and repulsions, light, heat, electricity, magnetism, cohesion, polarity, as expressed by motion, are the forces inherent in atoms, and all act according to fixed laws. By the study of their laws and actions and interactions, science is able to show that, given at any particular moment the number of atoms and their forces and their relative positions, a competent being would be able to foretell what, at a moment, ten millions of years later, would be the relative positions of all the said atoms to each other. Yet Dr. Flint says:—

Page 107.—"The atoms of matter are, it is said, eternal and immutable. [He makes no mention of their inherent forces.] Grant them to be so. There are, however, countless millions of them, and manifestly the universe is one—is a single, magnificent, and complicated system, is characterised by a marvellous unity and variety. We must be informed how the universe came to be a universe,—how it came to have the unity which underlies its diversity,—if it resulted from a countless multitude of ultimate causes. Did the atoms take counsel together, and devise a common plan and work it out? That hypothesis is unspeakably absurd. Yet it is rational in comparison with the notion that these atoms combined by mere chance, and by chance produced such a universe as that in which we live. Grant all the atoms of matter to be eternal; grant all the properties and forces [this is the first time Dr. Flint has indicated the existence of such things as "properties" and "forces"] which, with the smallest degree of plausibility, can be claimed for them, to be eternal and

immutable, and it is still beyond all expression improbable that these atoms with these forces, if unarranged, uncombined, ununified, unutilised by a presiding mind, would give rise to anything entitled to be called a universe. . . . No number of material atoms, although eternal and endowed with mechanical force, can explain the unity and order of the universe, and therefore *the 'supposition' of their existence* does not free us from the necessity of believing in a single intelligent cause—a Supreme Mind—to move and mould, combine and adjust, the ultimate atoms of matter in a single orderly system."

It is remarkable that Dr. Flint, in the last sentence, speaks of the existence of the atoms and their forces as a "supposition" (!) Well, I suppose if there are any things whatever to which such a word cannot rightly be applied—any things of whose existence we can be said to be sure, it is matter and force. I use the word "matter" intentionally, for whether matter is composed of larger or smaller bits is immaterial. It is also quite immaterial whether the word force shall ultimately be found to stand for matter as well. It cannot, I think, be denied, that Dr. Flint's use of the word "supposition," in relation to the existence of matter and force, cannot be justified. As to the inability of eternal or non-eternal atoms and forces, such as we know them to be, to produce the order and unity of the universe, such as they are, I think I may, without contradiction being possible, say that it was not possible for them—their number and powers and relations to each other being such as they must have been, and their modes of action being such as we know them to be—to produce any *other* state of things than that which exists at the present moment, and the "supposition" of any "Supreme Intelligence" being necessary to account for actions and results, being such as they have been and are, is wholly gratuitous.

When we consider that we know of no commencement of existence of either atoms or forces; when we recognise that

their modes of action are invariable, and in accordance with fixed laws, we find ourselves in the presence of a necessity so complete and absolute as to admit of only one possible course of events, only one possible mode of development, only one possible history, only one possible past, only one possible present, only one possible future. A fixed number of atoms, possessing fixed forces and invariably acting in fixed ways, can produce only fixed results. Dr. Flint speaks of "*chance combinations*" producing a "*chance universe.*" To speak of *chance action* and *chance results* is idle. *There is no such thing as chance.* As Professor Huxley says, in his "American Addresses," (page 2):—"The conception of the constancy of the order of Nature has become the dominant idea of modern thought. To any person who is familiar with the facts upon which that conception is based, and is competent to estimate their significance, it has ceased to be conceivable that '*chance*' should have any place in the universe, or that events should depend upon any but the natural sequence of cause and effect. We have come to look upon the present, as the child of the past, and as the parent of the future; and as we have excluded 'chance' from a place in the universe, so we ignore, even as a possibility, the notion of any interference with the order of Nature. Whatever may be men's speculative doctrines, it is quite certain that every intelligent person guides his life and risks his fortune upon the belief that the order of Nature is constant, and that the chain of natural causation is never broken."

Dr. Flint, however, having affirmed the necessity of the existence of a "Supreme Intelligence" to account for the "orderly system" of the universe, proceeds:—"There at once rises the question—Is it really necessary to believe both matter and mind to be eternal? No, must be our answer. The law of parsimony of causes directly forbids the belief, unless we can show that one cause is insufficient to explain the universe, and that we cannot do."

I think it is just what we can do, and have done. And

Dr. Flint's unneeded assumption of a Supreme Intelligence, in support of which he has given no proof whatever, is, I think, as flagrant an instance of the violation of the "law of parsimony" of causes as was ever perpetrated. But he proceeds:—

"We can show that *matter is insufficient*—that it cannot account of itself even for the physical universe—but *not that mind is insufficient*, not that mind cannot account for anything that is in matter."

That "matter" is insufficient to account for the state of things which we call the universe is perfectly true, and I agree with Dr. Flint as entirely as if he said two and two atoms cannot account for five atoms. But is Dr. Flint's statement a *complete* statement? Has any one ever for a moment supposed or asserted that matter—simply as matter—could account for the ordered state of things called the universe? Matter *alone* cannot do so. But I think it cannot for a moment be denied that matter *and force* can do so, and therefore the supposition that a "Supreme Intelligence" was "needed" to account for that for which matter and force sufficiently account, is needless. In the next sentence the same statement is made in a somewhat different form. "On what grounds can it be shown that a mind possessed of sufficient power to originate the universe [that is, to account for the collocations of matter known to us as such], the ultimate elements of matter [still no reference to force] being 'given,' could not also have created these elements? that the Supreme Intelligence which gave to each sun and planet and satellite its size and shape and position and motion, could not have summoned into being their constituent particles? On none whatever. We may not understand how they could be created, but we have no reason for thinking that they could not be created; and it is surely far easier and far more reasonable to believe that they were created, than that a countless number of inconceivably small indivisible particles of matter [still ignores force], lying far

beyond the range of our senses, but extending through immeasurable fields of space, should all, inconceivably minute although they be, be self-existent and eternal. The man who asks us to accept the latter supposition, asks us, it seems to me, to believe what is not only as mysterious as the self-existence of Deity, but millions of millions of times more mysterious. I should require strong reasons for assigning infinitely great attributes to excessively little things, and to an inconceivable number of them; but I can in this instance find no reasons at all."

When Dr. Flint asks why the "Supreme Intelligence" could not "create" the matter of the universe as well as "form" it, the answer lies close at hand. The only "mind" of which we have any knowledge is the human mind. Man, like Dr. Flint's imaginary "Supreme Intelligence," can "form," can "arrange" things: but because he can do so, he does not for a moment imagine that because he does so he can *create* such things as he arranges. He has sufficient power to produce "*changal causation*," but not to produce "*creational causation*," and the production of "*changal causation*" is all that Dr. Flint attributes to the "Supreme Intelligence," and there is no more warrant for attributing to "Supreme Intelligence"—even if Dr. Flint had proved its existence—than to "human intelligence," the hypothetical power of "*creational causation*." And besides, the human intelligence has this advantage, that we know of its existence, but of the existence of any *other* intelligence we have no knowledge whatever. Dr. Flint further urges that it is "easier and more reasonable" to believe in creation of atoms by a "Supreme Intelligence" than that "countless number" of "little bodies," atoms so inconceivably small, "should be self-existent and eternal," and that we have no reason for thinking that they could not be created. We are told that it "is easier" to believe in "creation" than in "eternal self-existence of atoms," and that the belief in such self-existence and eternity of atoms "is a mystery millions and

millions of times more mysterious than the self-existence of Deity." Very possibly it may be so, but then the former we have, I think, found to be an incontrovertible fact, while the latter is, as yet, at any rate, only a baseless supposition. If we could be "convinced" of the existence of a "Supreme Intelligence" possessed of the power of "*creational causation*," we should be as willing to believe—without taking into consideration any degree of "easiness" in the act—that things might originate as Dr. Flint seems to think they might and did originate; but unfortunately all the evidence is against that supposition. Our examination of Dr. Flint's statements and arguments in support of such a view lead to an exactly contrary conclusion.

But Dr. Flint has not yet said all he has to say in support of his thesis. He commences the next paragraph thus:—

Page 109.—"Then, in the third place, any plausible conceptions we can form of the ultimate nature of matter lead to the belief that even that is an event or effect, a something derivative and caused. [As I have before remarked, it is not the "nature" of matter with which we are concerned, but whether it existed eternally, or was created.] It must be admitted that the most plausible of these conceptions are vague and conjectural. We have a practical and relative knowledge of matter which is both exact and trustworthy—a knowledge of its properties from which we can mathematically deduce a multitude of remote consequences of an extremely precise character, but we are hardly entitled to characterise as 'knowledge' at all, any of the 'views' which have been propounded as to what it is *in itself*."

Dr. Flint then proceeds to consider some of the theories which have been advanced as to the ultimate nature of matter, which, as they do not touch our subject, it will not be necessary to consider, though we may ultimately have to do so.

Dr. Flint continues at page 113:—"But suppose the substratum of the universe to consist of a countless number

of inconceivably small indivisible particles of matter, and do we not even on this hypothesis reach by a single step the truth on which Theism rests, and on which only, Theism can be based? [As I said before, the ultimate constitution of matter does not in any way touch the question.] 'None of the processes of Nature,' says one of the most eminent of our physical philosophers (Clerk-Maxwell), since the time when Nature began [assumes that Nature had a beginning, which is the very point in dispute!] have produced the slightest difference in the properties of any molecule. We are, therefore, unable to ascribe either the existence of the molecules or the identity of their properties to the operation of any of the causes which we call natural. [Well, I should say we did not. Why it would imply that some molecules and properties had the power of "*creative causation*"—that some could "create" others. I think there needs no ghost come from the grave to tell us *that!*] On the other hand, the exact equality of each molecule to all others of the same kind gives it, as Sir John Herschel has well said, the essential character of a manufactured article, and precludes the idea of its being eternal and self-existent. Thus we have been led along a strictly scientific path, very near to the point where science must stop. . . . In tracing back the history of matter, science is arrested when she assures herself, on the one hand, that the molecule has been made, and on the other, that it has not been made by any of the processes we call natural.'* I believe that no reply to these words of Professor Clerk-Maxwell is possible from any one who holds the ordinary view of scientific men, as to the ultimate constitution of matter."

I have already commented upon the first statement that molecules have not created molecules, or have had their nature in any way altered "since the time when Nature

* President's Address in Transactions of the British Association for the Advancement of Science, 1870.

began," such "beginning of Nature" being only an assumption in support of which no evidence of any kind is given. I will now suggest that such absence of any evidence of commencement of existence of molecules and their properties tells, so far as it goes, in favour of eternal existence. *Why* the exact equality of each molecule to all others of the same kind gives it the character of a "manufactured article," and "precludes the idea of its being eternal and self-existent," passes my comprehension. All that we can say on the subject is that they *are* alike. Whether they are or not eternally self-existent can be decided, at least I at present see no other way, only by our discovering that there was a time when they, or, at any rate, something did not exist. And we have seen that, so far, Dr. Flint's arguments against their being eternally self-existent have not been satisfactory. Professor Clerk-Maxwell's statement that, "in tracing back the history of matter, science is *arrested* when she assures herself, on the one hand, that the molecule has been made," is so ambiguous that I find it difficult to decide what is his meaning. Does the word "made" stand for "created" in the sense of being a product of "*creational causation*," and so supposed to have "begun to exist," or "made" in the sense in which a man "makes" a chair, which simply means that his act was merely a case of "*changal causation*." In other words, that the existence of that form of matter called a particular molecule, was the result of the action of forces inherent in matter, and so acting upon each other as to result in the specified molecule. If the former, it denies the eternal self-existence of matter; if the latter, it says nothing either for or against it. Nevertheless Dr. Flint triumphantly continues:—

"They must suppose every atom, every molecule, to be of such a nature, to be so related to others, and to the universe generally, that things may be such as we see them to be; but this—their fitness to be built up into the structure of the universe—is a proof that they have been *made fit*,

and since natural forces could not have acted upon them while not yet existent, a supernatural power must have created them, and created them with a view to their manifold uses. Every atom, every molecule, must, even in what is called ultimate in it, bear the impress of a supernatural power and wisdom; must, from the very nature of the case, reflect the glory of God, and proclaim its dependence upon Him."

As to the atoms and molecules being of such natures, and so related to others, as by their interactions to bring about that state of things which we call the universe, being a proof that they have been "made fit," Dr. Flint offers us no proof beyond his own assertion. Experience compels us to believe that the atoms have always been what they are now, that they never, so far as we can judge, had any beginning; that the forces inherent in them have always been present, and always been the same, and that instead of having been "made fit" to group themselves together in such ways as have resulted in the universe, they could not by any possibility have done otherwise, and so needed no "Supreme Intelligence" to "make them fit" to do so, and that their modes of coming together are not the result of the direction and influence of supernatural wisdom, but only of the necessities consequent upon their inherent nature. Gravitational, chemical, cohesive, thermal, electric, and magnetic science, is able to trace their action upon and in matter, from the nebular state, to such modes of their action as have resulted in the solar system, of which we form a part, and to the formation of the globe on which we live. Dr. Sterry Hunt, the great American chemist, in his "Essay on the Chemistry of the Primeval Earth" ("Chemical and Geological Essays," second edition, page 35. Trübner and Co., Ludgate Hill, 1879), has the following passage:—

"The natural history of our planet, to which we give the name of Geology, is necessarily a very complex science, including, as it does, the concrete sciences of mineralogy,

botany, and zoology, and the abstract sciences, chemistry and physics. These latter sustain a necessary and very important relation to the whole process of development of our earth from its earliest ages, and we find that the same chemical laws which have presided over its changes apply also to those of extra-terrestrial matter. Recent investigations show the presence in the sun, and even in the fixed stars—suns of other systems—the same chemical elements as in our own planet. The spectroscope, that marvellous instrument, has, in the hands of modern investigators, thrown new light upon the composition of the farthest bodies of the universe, and has made clear many points which the telescope was impotent to resolve. The results of extra-terrestrial telescopic research have lately been set forth in an admirable manner by one of its most successful students, Mr. Huggins. We see, by its aid, matter in all its stages, and trace the process of condensation and the formation of worlds. It is long since Herschel, the first of his illustrious name, conceived the nebulæ which his telescope could not resolve, to be the uncondensed matter of which worlds are made. Subsequent astronomers, with more powerful glasses, were able to show that many of these nebulæ are really groups of stars, and thus a doubt was thrown over the existence of nebulous luminous matter in space; but the spectroscope has now placed the matter beyond doubt. By its aid, we find in the heavens, planets, bodies like our earth, shining only by reflected light; suns, self-luminous, radiating light from solid matter; and, moreover, true nebulæ, or masses of luminous gaseous matter. These three forms represent three distinct phases in the condensation of the primeval matter, from which our own and other planetary systems have been formed.

"This nebulous matter is conceived to be so intensely heated as to be in the state of true gas or vapour, and for this reason feebly luminous when compared with the sun."

The final paragraph of that portion of Dr. Flint's work

which he devotes to the proof of a commencement of matter, at page 117, is as follows:—

"To these considerations [which Dr. Flint has already advanced] it has to be added that some of our ablest physicists believe that in the present age *a strictly scientific proof has been found of the position, that the universe had a beginning in time.* 'According to Sir W. Thomson's deductions from Fourier's 'Theory of Heat,' we can trace down the dissipation of heat by conduction and radiation to an infinitely distant time when all things will be uniformly cold. But we cannot similarly trace the heat history of the universe to an infinite distance in the *past.* For a certain negative value of the time the formulæ give impossible values, indicating that there was some initial distribution of heat which could not have resulted, according *to known laws of Nature,* from any previous distribution. There are other cases in which a consideration of the dissipation of energy leads to the conception of a limit to the antiquity of the present order of things.'* If this theory be true, physical science, instead of giving any countenance to the notion of matter having existed from eternity, distinctly teaches that creation took place, that the present system of Nature and its laws originated at an approximately assignable date in the past. The theory is supported by the most eminent physical philosophers of this country, and if there be *any oversight or error* in the principles or calculations on which it is founded, *it would appear not to have been as yet detected.* It is a theory on which, however, only specialists are entitled to pronounce judgment; and, therefore, although those who assume that matter was not created are bound to refute it, I do not wish myself to lay any stress upon it, the more especially as I believe that, apart from it, there is amply sufficient evidence for holding that 'Nature is but the name for an effect

* Jevons' "Principles of Science," vol. ii., page 438 (in edition in one vol. at page xxix).

whose cause is God.' It seems to me, then, that the universe, when examined, must be concluded to be throughout —from centre to circumference—alike in what is most permanent and what is most changeable in it—an event or effect, and that its only adequate cause is a Supreme Intelligence."

I would direct attention to some of the statements made in the above paragraph.

" . . . That some of our ablest physicists believe that in the present age a strictly scientific proof has been found of the position that the universe had a beginning in time.

" . . . If this theory be true, physical science, instead of giving any countenance to the notion of matter having existed from eternity, distinctly teaches that creation took place, that the present system of Nature and its laws originated at an approximately assignable date in the past.

" . . . And if there be any oversight or error in the principles or calculations on which it is founded, it would appear not to have been as yet detected.

" . . . Although those who assume that matter was not created are bound to refute it, I do not wish myself to lay any stress upon it, the more especially as I believe that, apart from it, there is amply sufficient evidence for holding that 'Nature is but the name for an effect whose cause is God.'"

The "strictly scientific proof" set forth above, and in which it seems somewhat surprising that Dr. Flint, whose contention we have seen to be that matter had a beginning in time, should say, "he does not wish to lay any stress upon it," and that "if there be any oversight or error in the principles or calculations on which it is founded, it would appear not to have been as yet detected."

The statement quoted by Dr. Flint was made by Dr. Jevons in the first edition of his "Principles of Science," and first published in 1873. It was criticised by the late Professor Clifford in an article entitled, "On the First and the Last Catastrophe" ("Fortnightly Review," new series, April,

1875, page 480, and republished in his collected works, vol. i., page 191. Macmillan), and to which Dr. Jevons replied in the third edition of his "Principles of Science" (Macmillan), 1879, that is, four years subsequent to Professor Clifford's criticism. The edition of Dr. Flint's "Theism" from which I make all my quotations is the fifth, and is stated to be "revised," and was published in 1886, seven years subsequent to the third edition of Dr. Jevons' work, from which I am about to quote Dr. Jevons' own statement of Professor Clifford's criticism, and what came of it. Dr. Jevons' account occurs in his preface to the second edition of his work, page 29. It is as follows:—

"One point in my last chapter, that on the 'Results and Limits of Scientific Method,' has been criticised by Professor W. K. Clifford in his lecture, 'On the First and the Last Catastrophe.' In vol. ii., page 438, of the first edition (page 744 of this edition) of my own book, I referred to certain inferences drawn by eminent physicists, as to a limit of the antiquity of the present order of things.

"According to Sir W. Thomson's deductions from Fourier's 'Theory of Heat,' we can trace down the dissipation of heat by conduction and radiation to an infinitely distant time when all things will be uniformly cold. But we cannot similarly trace the heat history of the universe to an infinite distance in the past. For a certain negative value of the time the formulæ give impossible values, indicating that there was some initial distribution of heat which could not have resulted, according to known laws of Nature, from any previous distribution.

"Now according to Professor Clifford, I have here misstated Thomson's results. 'It is not according to "*the known laws of 'Nature,'*" it is according to "*the known laws of conduction of heat,*" that Sir William Thomson is speaking. . . . All these physical writers,—knowing what they were writing about,—simply drew such conclusions from the facts which were before them as could be reasonably drawn. They say,

Here is a state of things which could not have been produced *by the circumstances we are at present investigating.* Then your speculator comes, he reads a sentence and says, 'Here is an opportunity for me to have my fling.' And he has his fling, and makes a purely baseless theory about the necessary origin of the present order of Nature at some definite period of time, which might be calculated.'

"Professor Clifford proceeds to explain 'that Thomson's formulæ only give a limit to the heat history of, say, the earth's crust in the solid state. We are led back to the time when it became solidified from the fluid condition. There is discontinuity in the history of the solid matter, but still discontinuity which is within our comprehension. Still further back, we should come to discontinuity again, when the liquid was formed by the condensation of heated gaseous matter. Beyond that event, however, there is no need to suppose further discontinuity of law, for the gaseous matter might consist of molecules which had been falling together through infinite past time.' As Professor Clifford says (page 481) of the bodies of the universe, 'What they have actually done is to fall together and get solid. If we should reverse the process, we should see them separating and getting cool, and as a limit to that, we should find that all these bodies would be resolved into molecules, and all these would be flying away from each other. There would be no limit to that process, and we could trace it as far back as ever we liked to trace it.'"

After a few words explaining how he fell into the mistake, Dr. Jevons concludes, "So far as I may venture to form an independent opinion on the subject, it is to the effect that Professor Clifford is right, *and that the known laws of Nature do not enable us to assign a beginning. Science leads us backwards into infinite past duration.*"

CHAPTER II.

FROM THEISM WE TURN TO PHILOSOPHY AND PHYSICS.

So far then it would seem that to our question—Had the sum of things a beginning—was there ever a time when "Nature" was non-existent? the reply seems to be in the negative. Dr. Flint's affirmation that "Nature is but the name for an effect whose cause is God" cannot be sustained by the arguments he has advanced in its support. We have found that such instances of "creation," as he presented to us as proofs of a beginning of things, turned out to be not instances of "creational causation," but only of "changal causation." There was nothing new brought into existence, but only changes of aggregation or separation, of things already in existence. The "universe" did not consist of things newly created, but only of already-existing things newly arranged, and when we were called upon to wonder at the "wisdom" of the "Supreme Intelligence" which was affirmed to be indispensible to enable us to account—not only for the amazing power and knowledge displayed in "forming" the universe,—but in creating or causing to exist the matter out of which the universe was "formed," we found it impossible to reach back, even with all the assistance science was able to give us, to a time when that matter did not exist; and that the force inherent in matter, acting according to invariable law, was sufficient to account

for all relations and for all changes of relations whatever. We were thus obliged to reject the idea that a "Supernatural Intelligence" was the cause of either the matter or the force or the states of things consequent upon their mutual actions, and to conclude that matter and force are sufficient to account for all that needs to be accounted for—namely, changes of relations; and that when we ask—Whence comes man? there is but one reply—from "Nature."

But if not satisfied with the answer of Theism to our question, may we not seek for an answer elsewhere? Is Theism our only resource? Is there not also philosophy? Is there not also science? and better than either alone, is there not that "allied" philosophy and science, which when united are supposed to more than double the power possessed by either when acting alone; for science is ever at hand to correct philosophy, and philosophy is ever at hand to elevate science? The soul of man with all its powers and capacities, its consciousness, its sensation, its imagination, its thought, feels an unconquerable reluctance to believe—when it contemplates the seventy kinds of elementary substances known to us with the forces—gravity, chemical attractions and repulsions, cohesity, polarity, heat, electricity, magnetism—playing in and through and about them, that he is himself nothing more than a collocation in certain proportions of some of these. He knows that he has a certain kind of power over them which they have not over him. He feels, he knows, that he is infinitely superior to them. He can circumvent them, can "intentionally" so work one power against another that the result shall be such as he himself desires—shall be such as shall be to his advantage, to his good.

He looks round upon "Nature"—the Nature which has neither life nor soul nor mind—and he thinks, "Of what value are you, except as you serve my needs? In yourselves you are worth nothing. It is my existence which gives you the only worth you possess. "He takes the hugest telescope the mind and fingers of man have fashioned. He

selects some night when the heavens are like one black transparent diamond; when every star scattered in the infinity of space seems to be visible; when every star shines as if it were composed of some fiery spiritual glory. He gazes in all directions. He sees simultaneously as much of the heavens, as many of its stars as it is at present possible for a human being to see. He contemplates their countless numbers, he thinks of their awful distances, of the overwhelming mass of their physical substance, of the more overwhelmingly inconceivable powers and forces which are represented by these burning globes and points. Is he crushed by all this splendour of beauty and matter and motion and force? No, he looks at the boundless scene, and smiles. He smiles and says to himself, "Doubtless you are great, you are boundless, your strength and power and mass is to me unimaginable; but what are you compared to me? You are not conscious, you have no knowledge, no feeling, no thought, you know neither pleasure nor pain. For yourselves you have no existence. If you were at this very instant annihilated, what would it matter, except so far as it would affect those who, like me, live and feel and think? *You have but one office—service to me and to others like me.* From us you derive your value; without us you are nothing. Your existence, your non-existence are not equal in importance to the lowest animalcule that has life. If you were created, you were not created for yourselves, but for me, and such as me. But *were* you created, or are you self-existent? and is the "man"—who looks upon you with a kind of contempt as being infinitely lower than himself—but the result of the action and combination of an infinitesimal amount of that unconscious matter and force of which you are composed? Let us enquire of philosophy and science.

Dr. Flint leaves us no alternative but to believe that man comes from matter and force—that is, from Nature. I will not accept that conclusion unless I am compelled. But to

reject that conclusion upon insufficient grounds,—to reject it merely because it is distasteful,—would simply be folly. If I *do* come from matter and force only, my thinking that I do *not* come from matter and force will not alter the fact. But, at the same time, what *is* the Fact? and whatever the fact may be, is it possible for man to discover it?

CHAPTER III.

THE PROBLEM OF EXISTENCE.

MR. HERBERT SPENCER, in his "First Principles," in the chapter on "Ultimate Religious Ideas," remarks :—

Page 30.—"To the mind, as it developes in speculative power, the problem of the universe suggests itself. What is it? and whence comes it? are questions that press for solution. To fill the vacuum of thought any theory that is proposed seems better than none. . . . A critical examination, however, will prove, not only that no current hypothesis is tenable, but also that no tenable hypothesis can be framed. [This does not look very promising.] Respecting the origin of the universe, three verbally intelligible suppositions may be made. We may assert that it is *self-existent*, or that it is *self-created*, or that it is *created by an external agency*. Which of these suppositions is most credible, it is not needful here to enquire. The deeper question, into which this finally merges, is, whether any one of them is conceivable in the true sense of the word. Let us successively test them."

Page 31.—"In the first place, it is clear that by self-existence we especially mean an existence independent of any other—not produced by any other; the assertion of self-existence is simply an indirect denial of 'creation.' In thus excluding the idea of any antecedent cause, we necessarily

exclude the idea of 'beginning.' For to admit the idea of a beginning—to admit that there was a time when the existence had not commenced—is to admit that its commencement was determined by something, or was caused, which is a contradiction. Self-existence, therefore, necessarily means existence without a beginning; and to form a conception of self-existence is to form a conception of existence without a beginning. Now, by no mental effort can we do this. To conceive existence through infinite past time implies the conception of infinite past time, which is an impossibility."*

Is that true? I can certainly think a fortnight. Does it take fourteen days to "think" a fortnight? Does it take a longer time to think a fortnight than to "think" a week; and a shorter time than to think a month?

When Mr. Spencer uses the word "conception," he is evidently thinking not of "conception," but of "*experience.*" Let us change the word "conception" to the word "experience." "To 'experience' existence through un-finite past time, implies the 'experience' of unfinite past time, which is an impossibility." Of course it is. But a *conception* of unfinite past "time" is not. It is simply the thought of time *without* limit, and is simply what I call a "privative" idea, the formation of which presents no difficulty. I think, let us say, of an atom of gold enduring, existing for a moment—a minute—an hour—a day—a month—a year—a century—a hundred—a thousand—a million—a hundred thousand million centuries—all of which are limited periods of time;—it takes me no longer to think or "conceive" a million than to think a moment. Neither of them are things, they are only the names of human thoughts about "duration" or "time."

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* The edition of Mr. Spencer's "First Principles" from which I quote is the latest edition, the fifth. Williams and Norgate, 1884.

But then it may be asked—What *is* time?

Before we further consider the "problem of the universe" as propounded and commented upon by Mr. Spencer, I think it will be well first to consider Mr. Spencer's discussion of "ultimate scientific ideas."

CHAPTER IV.

ULTIMATE SCIENTIFIC IDEAS. SPACE AND TIME.

MR. SPENCER commences by asking (page 47), "What are space and time? Two hypotheses are current respecting them. The one, that they are 'objective;' and the other, that they are 'subjective'—the one, that they are external to and independent of ourselves; the other, that they are internal, and appertain to our own consciousness. Let us see what becomes of these hypotheses under analysis.

*(1) "To say that space and time exist *objectively*, is to say that they are entities. (2) The assertion that they are *non-entities* is self-destructive; non-entities are non-existences, and to allege that non-existences exist objectively, is a contradiction in terms. (3) Moreover, to deny that space and time are things, and so by implication to call them nothings, involves the absurdity that there are two kinds of nothings. (4) Neither can they be regarded as *attributes* of some entity; seeing, not only that it is impossible really to conceive any entity of which they are attributes, but seeing, further, that we cannot think of them as disappearing, even if everything else disappeared; whereas attributes necessarily disappear

* For convenience of reference I have numbered the sentences of the discussion of "Space and Time."

along with the entities they belong to. (5) Thus, as space and time cannot be either non-entities nor the attributes of entities, we have no choice but to consider them as entities. (6) But while on the hypothesis of their objectivity space and time must be classed as things, we find, on experiment, that to represent them in thought as 'things' is impossible. To be conceived at all, a thing must be conceived as having attributes. (7) We can distinguish something from nothing only by the power which the something has to act on our consciousness; the several affections it produces on our consciousness (or else the hypothetical causes of them) we attribute to it, and call its attributes; and the absence of these attributes is the absence of the terms in which the something is conceived, and involves the absence of a conception. (8) What, now, are the attributes of space? (9) The only one which it is possible for a moment to think of as belonging to it is that of extention; and to credit it with this implies a confusion of thought. (10) For extension and space are convertible terms: by extension, as we ascribe it to surrounding objects, we mean occupancy of space; and thus to say that space is extended, is to say that space occupies space. (11) How we are similarly unable to assign any attribute to time scarcely needs pointing out. (12) Nor are time and space unthinkable as entities only from the absence of attributes; there is another peculiarity familiar to readers of metaphysics, which equally excludes them from the category. (13) All entities which we actually know as such are limited; and even if we suppose ourselves able either to know or to be able to conceive some unlimited entity, we of necessity in so classing it, positively separate it from the class of limited entities. (14) But of space and time we cannot assert either limitation or the absence of limitation. (15) We find ourselves totally unable to form any mental image of unbounded space, and yet totally unable to imagine bounds beyond which there is no space. (16) Similarly at the other extreme: it is impossible to think of a limit to the divisi-

bility of space, yet equally impossible to think of its infinite divisibility. (17) And, without stating them, it will be seen that we labour under like impotencies in respect to time. (18) Thus we cannot conceive space and time as entities, and are equally disabled from conceiving them as either the attributes of entities or as non-entities. (19) We are compelled to think of them as existing, and yet cannot bring them within those conditions under which existences are represented in thought.

(20) "It results, therefore (page 50), that space and time are wholly incomprehensible. (21) The immediate knowledge which we seem to have of them proves, when examined, to be total ignorance. (22) While our belief in their objective reality is insurmountable, we are unable to give any account of it. (23) And to posit the alternative belief (possible to state, but impossible to realise) is merely to multiply irrationalities."

Not a very satisfactory conclusion, and, I think, not a true one. But let us begin at the beginning. Mr. Spencer commences—(1) "To say that space and time exist objectively, is to say that that they are entities." On the contrary, it seems to me that only one of them—"space"—is "objective," and therefore an entity; while "time" is the name of a thought, and therefore "subjective." Time is a thought about the endurance or continuing to exist of things, or of the continuing to exist of the states, actions, etc., of things. I see a candle burning. I "think," How long—that is, what time—will that candle continue to burn? How long will its burning "endure" or "continue?" If no one sees it, or, seeing it, does not "think" about the "enduring" of its burning, the "thought" of "time" in relation to it will not come into existence. When the candle ceases to burn—when the burning comes to an end, its "time" of enduring has come to an end. In relation to that burning, "time" has ceased to be. If twenty candles are supposed to be burning together, each has its own particular "time," and,

for a time, all those times, those "endurances of burning," co-exist together—that is, if anybody "thinks" about the duration of their burning; if no one thinks about the enduring of their burning, there is only duration, but not time, for time is a "thought" *about* "duration"—not a "thing," not objective, not an entity, but subjective. My "thought" takes nothing away from the candle, adds nothing to it. As we cannot think of space ceasing to be—ceasing to endure, ceasing to continue to exist—and time being the name of a thought about duration, whenever we think of the "during" of space we think of its "time" of "during;" and seeing that we cannot conceive or think its non-existence, we are obliged to think its time of existence as un-finite, without end, eternal, which brings us to a consideration of what the word "space" means to us.

If two bodies happen to be a yard off each other they cannot be said to be together, they do not "touch" each other. What is there between them? (For the sake of simplicity I suppose the two bodies to be in vacuo.) There, of course, *must* be something between them, else they *would* "touch." What is it that separates—that is between them? We reply—Well, the only answer possible seems to be, "that which separates the two bodies is space." Nothing could not "separate" them, else "nothing" would be "something;" therefore space must be something.

Mr. Spencer has used the words "objective" and "subjective." Let us try to get some clear idea of what they mean, and also what they connote:—

First, "subjective." "Subjective" supposes the existence of something capable of being acted *upon;* and that such "something" is capable of being conscious of "being acted upon." I do not attempt to explain what being "conscious" *is*. It is an ultimate, a fact beyond which we cannot go, a thing which has no other explanation than its existence. If a person, when I speak of being "conscious"—of being

"capable" of being "conscious"—does not know what I mean, I cannot give him any explanation. The only way in which consciousness can be known is by experiencing it; as the only way of knowing what seeing means is to experience it.

An object is that which by somehow acting upon me, produces in me a state of consciousness, a "state" which is not caused by any act of "me," which has its cause not in "me," but outside of "me," and I call that external cause an "object." I have not the least idea what that cause is in itself. All I know of it is the effects it produces upon me, and that it is external to me. All the causes of such effects I call "objective." All such changes in my mental state which are not objectively caused I call "subjective"—indeed, from one point of view a sensation is subjective—and believe that "*I*" am their cause. I need hardly note that I am obliged to consider that which I call my body as wholly external to me, as entirely "objective." All states of myself which I consider have an "objective" cause I call "sensations." All states of myself which are not caused by things external to myself I call "subjective." But, strictly speaking, all my mental states, whether externally or internally caused, are in one sense subjective. The word "objective" refers only to the "*cause*" *which produces the subjective state* as being external. The objective causes sensation (which *when* caused is "subjective"). The subject, or "I," causes thought. In sensation I am entirely passive—like an anvil which is struck. In thinking I am active, I perform an act. A "thought" is a name for an action of my mind, my "mind," which is "I," which is "me," which is "myself."

Now when I am affected by some cause external to myself, I am obliged to attribute that affection to *something*; and when I am conscious of the two bodies which are separated by the distance or spatial extension which I call a ard, that consciousness must have a cause. I call that

cause the "yard" which separates them. "Yard" of what? Well, I have only one answer—The "yard" of "distance" or "extension" or "space." I cannot call space, extension, distance—whatever it is—nothing, for it *affects* me in a certain way, and to that affection I must give a name, for it certainly is an "entity," an "existence" of some kind. I call it "extension," or "space." I do not call the totality of space "distance," but only so much of it as I perceive between two objects, or between myself and an object. Space between or surrounding a plurality of objects I speak of as distances.

That which causes our perplexity in thinking about *that* which affects us, in the particular way we have named, the "consciousness of space," is, that it affects us in that one single way alone. It has, at the first thought about it, only one attribute, extension—that is, it "affects" us only one way; which means that we cannot acquire any further knowledge of it. Every man is to himself the centre of space. In all directions it radiates from him. He can commence to radiate, first by actual vision, then by imagining a line starting from himself as a centre and endeavour to find for it a limit. As he has never had experience of absence of space, he cannot, however long or however far he may imagine that line to extend, imagine it ceasing to be capable of being extended further. And that is only a *single* "radiant." While he has in imagination extended his line till he becomes painfully convinced that to think of ever coming to the end of space is an impossibility, he reflects that the imagined line which has been the subject of his thought, has been extended in only one direction, and endeavours to think of another equally endless line to be extended in a directly opposite direction; he vainly tries to imagine himself moving for ever in two opposite directions, and also in an unthinkable number of directions continually differing from each other. At last he gives up in despair, and comes to the conclusion that even to think of space as limited is an

impossibility, it is un-finite. It has neither length nor breadth nor thickness. It has no "dimensions" at all, and—unless he be a "mathematican,"—he perceives the absurdity of seeking for a "fourth dimension" in that which cannot be thought of as having any dimension whatever, either of length or of breadth or of thickness, for each of these is a limitation in some direction, and we cannot think of space as limited in any direction.

It is impossible even to suppose the non-existence of space. It is impossible, therefore, to think of its coming *into* existence. For what could we imagine in its place? It is impossible to frame thoughts or words which could consist with the non-existence of space. We cannot think of a before, before it; we cannot think of an after, after it. One thing, I think, is clear—that space is a "thing"—a "thing" possessing the quality or property or attribute of "extension," by means of which it affects us—that it is 'objective."

It has been supposed by many that space possesses not only "extension," but also, though to an infinitesimally small extent, "force"—that is, that it opposes some small amount of resistance to the passage through it of celestial bodies. The special evidence in favour of such a supposition being the observed retardation of Encke's comet and others. Professor Tait has, however, shown that to be an error. My authority for this statement is Professor Clifford. In "The First and the Last Catastrophe," vol. i. of his collected works (page 223), Professor Clifford writes:—

"It has been maintained for a long time that there is a certain resisting medium which the planets have to move through; and it may be argued that in time all the planets must be gradually made to move in smaller orbits, and so to fall in towards the sun. But, on the other hand, the evidence on which it was based, the movement of Encke's comet and others, has been recently entirely overturned by Professor

Tait. He supposes that these comets consist of bodies of meteors. Now it has been proved a long time, that a mass of small bodies travelling together in an orbit about a central body will always tend to fall in towards it, and that is the case with the rings of Saturn. So that, in fact, the movement of Encke's comet is entirely accounted for on the supposition that it is a swarm of meteors, without regarding the assumption of a resisting medium."

We have no reason, therefore, to suppose that "resistance" is an "attribute" of space. But "time?"

"Time" we have, I hope, seen to be merely a name signifying our recognition of the continuance of some existence. That continuity may be very brief, as that of a flash of lightning, or it may be "eternal," like that of space. But we cannot take cognisance, or even think of anything which has not *some continuity* of "duration." The length of the continuity means the "time" of its duration. The flash of the lightning is amongst the shortest durations we know. The duration of space is the longest we can think of. Indeed, the term "long" cannot be applied to it. That which is "long" has a limited "duration;" its "time" has some limit. The "duration" of "space" we can think of only as eternal. "*Time*" *is not a* "*thing*," *an entity; it is a thought about duration.* "Space" is a "thing" which eternally endures, which necessarily gives rise to the "thought" eternal, or "time"—eternity.

And now, I think, we may return to Mr. Spencer.

The sentences 1 and 2 we have already considered, and have come to the conclusion that space is an entity, is objective, and that time is the name of continued existence or duration, and is a "thought" about duration. If the "existence" ceases, then its time "ceases." Everything—so long as it endures—continues to exist, has its *own* "*time*" *of existing*. When a man dies we say, "his 'time' was up," for he ceases to exist.

We come to 3. "Moreover, to deny that space and time

are things, and so by implication to call them nothings, involves the absurdity that there are two kinds of nothing."

We do not do anything so foolish; and seeing that space only is an entity, and time is duration of space, and things, and of any combination of things in space, we are not obliged to commit such an absurdity.

4. "Neither can they be regarded as attributes of some entity; seeing, not only that it is impossible really to conceive any entity of which they are attributes, but seeing, further, that we cannot think of them as disappearing, even if everything else disappeared; whereas attributes necessarily disappear along with the entities they belong to."

We have seen that space is an entity, the attributes of which are extension and eternal duration, and that time is the name of a thought about duration, whether limited or eternal; so the contradiction does not arise.

5. "Thus, as space and time cannot be either non-entities nor the attributes of non-entities, we have no choice but to consider them as entities."

Space *is* any entity, while time is a thought about duration.

6. "But while on the hypothesis of their objectivity space and time must be classed as things," etc.

Only one is objective—space. Time is subjective, therefore it cannot be classed with things, but thoughts.

"To be conceived at all, a thing must be conceived as having attributes."

"Space" has the "attributes" extension, un-finity, and eternal duration; while "time" has the attributes of eternity, longness, shortness, slowness, quickness, heaviness, limited continuousness, etc.

7. "We can distinguish 'something' from 'nothing' only by the power which the 'something' has to act on our consciousness; the several affections it produces on our consciousness (or else the hypothetical causes of them) we attribute to it, and call its attributes; and the absence of

these attributes, is the absence of the terms in which the something is conceived, and involves the absence of a conception."

Mr. Spencer here makes two very curious statements. He says, "We can distinguish something from nothing only by the power the 'something' has to act upon our consciousness."

Now it is not possible—as it seems to me—to distinguish a "something" at all, unless there is another "something"—a *something else from which* to "distinguish" it. *If there is no "something else," distinguishing cannot take place.* Now we can hardly call "nothing" a "something," and unless we consider—but language fails one—I cannot say *a* nothing and yet must say it, only it is to be understood that it is nonsense—and unless we consider "nothing" to be a "something," how is the distinguishing to occur? Sensation is the consciousness of differences, or a difference; when there is no difference, there can be no sensation. The way we are conscious of space is from *its difference from all bodies;* but as it exhibits only *one difference* from all kinds of bodies, as it always presents the *same "difference"* from all bodies, our knowledge of it is limited to that one difference, which is—extension, for it has no perceivable differences in itself. There is only *one kind* of space. Whether there *are* differences in it, but which we have not powers to discern, we shall most likely have to consider by-and-bye.

The other curious statement made by Mr. Spencer is in relation to "consciousness." He says, "We can distinguish something from nothing, only by the power which the something has *to act on our consciousness;* the several affections it produces *on our consciousness* (or else the hypothetical causes of them) we attribute to it, and call its attributes." Which distinctly implies, indeed asserts, that there is such a "*thing*" as consciousness, and that objective, external causes act *upon* it.

I have, for reasons already stated, declined to attempt to

explain consciousness. I assume that everybody knows what to be "conscious" means. When I am conscious I am aware of something. A man cannot be conscious of something, and at the same time be unconscious. When I am asleep, and not dreaming, I am unconscious. Some one suddenly awakes me by running a pin into me. I am awaked by the pain. I am "conscious" of the pain. The pin acted upon *me*. Did it act upon my "*consciousness*?" How could it, when I was asleep and unconscious? Consciousness is not a *thing* which can be acted upon, but a *state*. But a "state" must be a "state" of something. To say that "consciousness" is a "state" of "consciousness" is absurd, for it implies that consciousness is a "thing," and that consciousness is *also* a "state" of that thing. Whereas consciousness, instead of being a state of "consciousness" is a "state," not of "consciousness," but of some creature capable of being put into a "state" which we call consciousness. Before the pin pricked me I was unconscious, therefore the pin was not a something which acted upon "consciousness"—for there was none—but upon a thing which, though unconscious at the time of the entrance of the pin, was capable of being conscious. The action? The action of the pin was of a kind capable of causing consciousness in that thing capable of being put into that state; but that "thing" was not my "*consciousness*"—but was *me*—was *myself*. Well, then, "*I*" am in a state of consciousness produced by the action upon me of the pin. Some one rings a bell. I hear it. That is "I"—"me"—"myself"—and it causes another conscious "state" of "myself." Is that new "state" of which I am "conscious" produced by the "consciousness" of the pain of the pin-prick being "*acted upon*" by the sound of the bell? Some one opens, directly under my nose, a bottle of smelling salts. "I"—"*ego*"—have a new "consciousness" of what we call the smell of the salts. Is that new "consciousness" caused by the action of the salts upon my "consciousness" of the pain of the pin-prick and

my "consciousness" of the sound of the bell? Hardly, I think!

I have spoken of "I" as being unconscious, of "I" as being conscious. What *am* "I?" Well, as we only "know" "differences," my knowledge of myself is limited—like other knowledge of things—to differences. The fundamental difference of which I have knowledge is that "I" am "different" from all other things. The condition of my knowledge of myself as an entity, is that I am conscious of some distinction betwixt myself and everything else. I do not know *what* I am, but I do know that *I* am "different" from the *totality* of *things*, and that the *totality* of things is different from *I*. I do not know *what* "I" is. I do not know *what* "not—I" is. But I know that the difference between us is absolute. Neither I, nor any other human—nay, nor any other conscious creature, ever mistook "*itself*" for any shape or form of the *not itself*. It is a certainty that nothing can shake.

It is an invariable and universal experience, and if any reasoning could be adduced which should prove, with apparently absolute certainty, that there was no real distinction between "I" and the "not—I," I should laugh at it, and say, "It is much more likely that there should be a fallacy in your reasoning, than that the totality of human experience should testify falsely." In fact, for me to believe that I am not absolutely different from all other existences, without any exception whatever, is an impossibility. Hence the absurdity of Pantheism. Consciousness is not a "thing," it is a "state"—a state not of consciousness, but of something, of an "I," capable of being put into that state, either by the action of objective causes acting upon it, or of a subjective cause acting in it, and that internal actor is "I."

But how are we to understand un-consciousness? If I am so absolutely different from all other things, it must be a continuous difference; and if difference is the condition of

consciousness, and the difference betwixt me and all other things always exists, how can I ever be unconscious?

As we have not yet considered the things which will, I hope, enable us to give a satisfactory reply to that question, it must for the present be left unanswered. But even if I cannot at present give a satisfactory reply, it will make no difference to the argument I have used. But I think a satisfactory reply is possible. But various points will have first to be considered. For the present, we will return to Mr. Spencer.

8. "What, now, are the attributes of space? 9. The only one which it is possible for a moment to think of as belonging to it is that of extension; and to credit it with this implies a confusion of thought. 10. For extension and space are convertible terms: by 'extension,' as we ascribe it to surrounding objects, we mean occupancy of space; and thus to say that space is extended, is to say that space occupies space."

The contradiction affirmed by Mr. Spencer does not arise. It merely raises a question of fact, not of contradiction. The question—hereafter to be considered—of the relation of matter to space, which, an atom being supposed to be present in space, is—Where the atom is, is there *also* space? If the atom were to cease to be, would there be space where the atom had been, or would there be nothing? As "nothing" is inconceivable, either the atom and space co-existed together in the same place, or only the atom existed. If the latter, then, supposing the said atom were the only one, the totality of things would consist of space and that one atom, and space would not be infinite. But space and the single atom would, together, be infinite. A very knotty point, involving the most far-reaching and momentous issues, but respecting which it will be necessary to come to a distinct conclusion by-and-bye.

At sentence 12, Mr. Spencer writes:—

12. "Nor are time and space unthinkable as entities only

from the absence of attributes." [Attributes of space are extension, infinity (?)—if not infinity, yet certainly enclosing all things — eternity, incompressibility, unchangeableness, indivisibility; of time—eternal, long, short, heavy, slow, swift, etc.]

13. "All entities which we actually know as such are limited; and even if we suppose ourselves able either to know or to be able to conceive some unlimited entity, we, of necessity in so 'classing' it, positively separate it from the class of limited entities."

But in the presence of an unlimited—that is, "infinite" entity, how could there be any *other* entity—"limited" or otherwise?

14. "But of space and time we cannot assert either limitation or the absence of limitation. 15. We find ourselves totally unable to form any mental image of unbounded space, and yet totally unable to imagine bounds beyond which there is no space."

We do not form the conception of boundless space by *imaginary "vision,"* but by *imaginary "motion."* If in thought we come to some matter which stops our progress, we are compelled to think that either the matter has bounds, beyond which we begin again to progress, or else that the matter itself has no bounds, which again leads us to the question whether there is space where matter exists, or only matter. If the latter be the fact, we should, instead of saying that space is un-finite, have to say, that the sum of things consists of matter and space, which together constitute an "Infinity," and are "unlimited."

16. "Similarly at the other extreme: it is impossible to think of a limit to the divisibility of space, yet equally impossible to think of its infinite divisibility."

If space is infinite, it is not divisible at all. If infinity consists of space and matter, then space and matter together are indivisible. Different relations then might be and are, but not division. Where there was not space, there would

be matter. Where there was not matter, there would be space. But *between* space and matter there could be no vacant —space,—I was going to say,—no vacancy, no "nothing," no "division."

18. "Thus we cannot conceive space and time as *entities*, and are equally disabled from conceiving them as either the *attributes of entities* or as *non-entities*. 19. We are compelled to think of them as existing, and yet cannot bring them within those conditions under which existences are represented in thought.

20. "It results, therefore, that space and time are wholly incomprehensible. 21. The immediate knowledge which we seem to have of them proves, when examined, to be total ignorance. 22. While our *belief* in their objective reality is insurmountable, we are unable to give any rational account of it. 23. And to posit the alternative belief (possible to state, but impossible to realise) is merely to multiply irrationalities."

To which I reply, that space and time are understandable by us. Space, as objective extension to which we can imagine no limits—unless it is limited so far as it contains all bodies—or beginning to exist, or ceasing to exist. Time, is the recognition of that existence as being without limit or beginning or cessation, and is called eternity or eternal time. Time is also a thought about other existences, a thought respecting longer or shorter durations of particular aggregations or separations of matter.

Our "immediate knowledge" is true, as far as it goes. It is immediate and true, but it is not complete; but only partial. We are not so foolish as to suppose we can have immediate and also complete knowledge *of that which has no bounds*. What we do know irresistibly leads to the conclusion that space, whether limited by the bodies it contains or not, *is an objective entity;* and seeing that it is impossible to conceive its absence, its having a beginning, or having an ending, we are compelled to believe it to be eternal. Such

a conclusion is not "knowledge," but "belief," in relation to which I must make a few remarks.

What is the difference between "knowledge" and "belief?" For me, "*knowledge*" *is the product of my own personal experience.* "*Belief*" *is consequent upon the testimony of other persons or things, or of reasoning about them.* Belief may be, practically, as *certain* as knowledge. When testimony is so strong as to render belief equal to knowledge, then, if occasion require, I act upon it as unhesitatingly as if it were knowledge. For instance: I have never been to Bombay. Suppose some one wished me to go there, and I was willing to go. I should prepare to do so, and set out on the journey with complete "certainty" of finding Bombay; although I did not "know," but only "believed," there was such a place. My certainty would be consequent upon the weight of testimony to its existence. For testimony — which is simply the affirmed "experience" of others—may be so strong as to amount practically to certainty. So completely so, that though properly speaking I did not "know" there was such a place as Bombay, my "belief" would be so strong I should say I "know" that there is a city called Bombay; the fact being that I did *not* "*know,*" but only "*believed*" it. Now the testimony presenting itself to me, both externally and by reasoning of my own mind, is such that, practically, I may almost say not that I believe space is boundless, except so far as it may be considered to be "bounded" by the bodies it contains, but that I "know" it is. (Whether such "contained" bodies *do* limit space will hereafter be considered.) The "total ignorance" affirmed by Mr. Spencer is entirely imaginary.

22. "While our belief in their objective reality is insurmountable, we are unable to give any rational account of it."

I do not believe in the "objective," but only the "subjective" reality of time. For the reasons given, I *do* "believe" in the "objective" reality of space.

23. "And to posit the alternative belief (possible to state,

but impossible to realise) is merely to multiply irrationalities."

What I have said above answers the last sentence. It seems to me that Mr. Spencer is able to speak of "multiplying irrationalities" because he accepts and reasons from groundless premises. True ideas of space and time lead to no "irrationalities." They simply lead to a recognition that time is but a thought about duration of existences, and that space, or space and matter together, cannot even in thought be limited either in extent or duration; but they also lead to the enquiry whether that "unlimitedness" really belongs to space only, or to space and matter considered as together constituting infinity. That there *is* "infinity," we are not capable of doubting.

CHAPTER V.

MR. SPENCER ON "ULTIMATE SCIENTIFIC IDEAS; THEIR 'CONTRADICTIONS,' 'IMPOSSIBILITIES,' AND 'IRRATIONALITIES.'"

THE TRANSFER OF MOTION—MOTION AND REST—PHYSICAL FORCE AND MUSCULAR FORCE—THE NATURE OF MATTER, NEWTON'S THEORY—BOSCOVICH'S THEORY—CENTRES OF FORCE WITHOUT EXTENSION—ANOTHER THEORY, "SPHERES" OF FORCE, OR POWER, WITH EXTENSION—IS MATTER INDESTRUCTIBLE?—OBJECTIONS TO MR. SPENCER'S CONCLUSIONS RESPECTING ULTIMATE SCIENTIFIC IDEAS—THE ULTIMATE OF ULTIMATES: FORCE—THE TRUE RELATION OF SPACE TO FORCE—SPACE ANTERIOR TO FORCE.

We have seen that Space presents itself to us under only one unchangeable aspect. It affects us in only one way, and that way is negative. The way in which it affects us, is by *not* affecting us. It might seem to be thus all the same as nothing. It has neither colour, nor taste, nor feel, nor smell, nor force. The only way in which we know it, is by extension—by the distance between bodies, which, as I before noticed, we cannot think to be nothing.

Matter is the complete opposite. All that Space does not do, Matter does. What is the nature and constitution then of Matter? By what means does it produce upon us all those various effects which Space does not do?

Mr. Spencer, after the discussion of Space and Time which we have been considering, proceeds to the discussion of another "ultimate scientific idea"—that of Matter. At page 50, he says:—

"Matter is either 'infinitely' divisible, or it is not. No third possibility can be named." After discussing opposing

opinions, he concludes—(page 51)—"To human intelligence the one hypothesis is no more acceptable than the other."

"Again,—leaving this 'insoluble question'—let us ask whether 'substance' has, in reality, anything like that extended 'solidity' which it presents to our consciousness [not to our "consciousness," but to "us."] . . . Shall we say, that, whether it consists of an infinitely divisible element, or of ultimate units incapable of further division, its parts are everywhere in actual contact? To assert as much entangles us in insuperable difficulties. Were Matter thus absolutely solid, it would be—what it is not—absolutely incompressible; since compressibility, implying the nearer approach of constituent parts, is not thinkable, unless there is unoccupied space between the parts. Nor is this all. It is an established mechanical truth, that if a body, moving at a given velocity, strikes an equal body at rest, in such wise that the two move on together, their joint velocity will be but half that of the striking body. Now it is a law, of which the negation is inconceivable, that in passing from any one degree of 'magnitude' to any other, all intermediate degrees must be passed through. Or, in the case before us, a body moving at velocity 4, cannot by collision be reduced to velocity 2, without passing through all velocities between 4 and 2. But if Matter were truly solid—were its units absolutely incompressible and in absolute contact—this 'law of continuity,' as it is called, would be broken in every case of collision. For when, of two such units, one moving at velocity 4 strikes another at rest, the striking unit must have its velocity 4 instantaneously reduced to velocity 2; must pass from velocity 4 to velocity 2 without any lapse of time, and without passing through intermediate velocities; must be moving with velocities 4 and 2 at the same moment, which is impossible."

I have quoted the above, not for the sake of what is said about Matter—the word used ought to have been not Matter, but a body—for no one supposes a "body" to be a

solid in the sense of having no interstices between the atoms of which it consists—but for the sake of what is said about velocities. The rate of a motion is determined by the force actuating the body and the amount of resistance to be overcome. If a body moves in ten minutes from a given point to another given point, it must move at a certain rate. If another similar body moves over the same space in one minute, it must have moved ten times as fast as the other body. "Motion" is not a "thing," it is a "state" of a "body," just as "consciousness" is not a "thing," but a "state" of an "*Ego*." While a given motion lasts, it is continuous. If a motion ceases, it ceases because the force which caused the motion is no longer able to overcome the resisting force. If motion recommences, its cause cannot be that force which previously caused motion, for motion ceased because that force was incompetent to continue the motion; it must be some new and competent force. When one billiard ball by striking another billiard ball causes the latter to move, the motion of the latter will be "continuous" so long as the force imparted to it is competent to overcome such resistance as was offered. When the opposing forces — as gravity, friction, etc.—are greater than the force operating on the ball, the ball will stop. And it is self-evident that motion of the arrested ball could not recommence without the accession to it of some new force.

At page 56, Mr. Spencer considers the "Transfer of Motion," where he says, "Another insuperable difficulty presents itself when we contemplate the 'Transfer of Motion.' Habit blinds us to the marvellousness of this phenomenon. Familiar with the fact from childhood, we see nothing remarkable in the ability of a moving thing to generate movement in a thing that is stationary. It is, however, impossible to understand it. In what respect does a body, after impact, differ from itself before impact? What is this added to it which does not sensibly affect any of its properties [a most

important statement, to which we shall have to refer by-and-bye], and yet enables it to traverse Space? . . . The motion you say has been communicated."

No, Mr. Spencer; we do not say so. "Motion" is a "state" of a body, and obviously cannot be communicated to another body, any more than when you pour water out of one full pot into another empty pot of the same size, and fill it. The state of fulness of the second pot is not the "communicated" state of fulness of the first. It was "water" that was "communicated," not "fulness." There *was* the state of fulness of the first pot; there *is* the state of fulness of the second. The water is the same, but not the "states of fulness."

"But how?—what has been communicated? The striking body has not transferred a *thing* to the body struck; and it is equally out of the question to say that it has transferred an *attribute* [Mr. Spencer's italics]. What has it transferred?"

And here Mr. Spencer ends his paragraph. Ends it without answering his own question! Ends it as if he had propounded something either incapable of being answered at all, or only by multiplying "irrationalities." Did Mr. Spencer never throw a ball, or bowl a hoop, or throw coals upon the fire? Why that which effects all *physical* changes has been transferred—Force, and has produced one of two alternative effects—Motion; the *other* effect of force-action being "Pressure."

It is not "Motion" that can be "transferred," but Force, which causes Motion. Motion, being a state of a body, cannot be transferred, for how is it possible to transfer a state of one thing to some other thing? But it *is* possible by the transfer of some of the force—which, for instance, caused the motion of one billiard ball—to another billiard ball, and to thereby cause in it a similar "state"—a "state" of motion. If the moving ball, by impact, transfers to the second ball half its force, then its motion will be only

half as rapid as it was before impact; and the second ball, having received from the first ball half its force, the two will move together at the same rate.

The passage of force from one body to another is "marvellous" enough, but it involves no "contradiction," no "irrationality" whatever.

In the next paragraph, (page 57), Mr. Spencer considers another "puzzle":—

"Once more, there is the old puzzle concerning the connection between Motion and Rest. We daily witness the gradual retardation and final stoppage of things projected from the hand or otherwise impelled; and we equally often witness the change from rest to motion produced by the *application of force*. [How was it possible for Mr. Spencer to write those words and fail to apply them to the subjects we are discussing?] But truly to represent these transitions in thought we find impossible. ["Truly," a strange affirmation. We can both "represent them in thought," and behold them in the concrete. The "transition," that is, but not that which "causes" this "transition"—the "force"—which is invisible. But we can *feel* the force, and understand, not what the force is in itself, but how its "application" causes the effect we call the "transition."] For a breach of this 'law of continuity' seems necessarily involved; and yet no breach of it is conceivable. [Mr. Spencer did not find it so a little while ago!] A body travelling at a given velocity cannot be brought to a state of rest, or no velocity, without passing through all intermediate velocities [!] At first sight, nothing seems easier than to imagine it doing this. It is quite possible to think of its motion as diminishing insensibly until it becomes infinitesimal; and many will think equally possible to pass in thought from infinitesimal motion to no motion. But this is an error. Mentally follow out the decreasing velocity as long as you please, and there still remains *some* velocity. Halve, and again halve the rate of movement for ever, movement still exists yet;

and the smallest movement is separated by an impassable gap from no movement. As something, however minute, is infinitely great in comparison with nothing [such a comparison cannot be made], so is even the least conceivable motion infinite as compared with rest. The converse perplexities attendant on the transition from rest to motion need not be specified. These, equally with the foregoing, show us that though we are obliged to think of such changes as actually occurring, their occurring cannot be realised."

Mr. Spencer says above, "Mentally follow out the decreasing velocity as long as you please, and there still remains *some* [Mr. Spencer's italics] velocity. Halve, and again halve the rate of movement for ever [that is a good long time], yet movement still exists."

One would imagine that Mr. Spencer would have given us some reasons in support of such an extraordinary assertion. He however gives none. I have, by anticipation, already shown why I must deny the truth of what Mr. Spencer affirms. I will give another reason for so doing.

I have previously alluded to the fact that *all motion is opposed by gravity*. The force causing any supposed motion must first have conquered gravity. But the conquest is only temporary, for as gravity is a "continuous" force, I think no one will dispute that gravity will, in the long run, prove the conqueror. I will suppose any instance of motion—not being that of a celestial body moving in space—and show why it *must* come to rest. We will suppose a two-thousand pound shot propelled from its proper gun at an initial rate of two-thousand feet a second. Let it be propelled along a perfectly smooth and level plane. The force by which the ball is propelled is a force which has been "communicated" to it, and is limited in amount. By the opposition of the force of gravity, and by friction, its velocity will gradually diminish, till at last it moves at the rate, say, of a foot a second. Its rate has been by gravity and friction reduced to a two-thousandth part of what it was

at first. Will gravity fail to bring it eventually to an absolute stand still, to perfect rest? So long as the unexpended force of the ball is "greater" than the force of gravity and friction, the ball will continue to move. When the force of the ball becomes less than, or merely equal, to the opposing force of gravity and friction, then the two opposing forces will neutralise each other, the ball will be reduced to a state of Pressure, and motion will absolutely cease—not only cease, but before the ball can again be made to move, a force equal to two thousand pounds—which is the measure of the force of gravity, that is, its "weight" acting upon the ball—must be communicated to it before it can move. Instead of "*some* velocity" being present in it, it is *two thousand pounds*, "*minus*" *any velocity at all.* Mr. Spencer's affirmation that "all efforts to understand its essential nature do but bring us to 'alternative impossibilities of thought,' I leave to the judgment of the reader.

"Motion" is the result of the conflicting action of unequal forces. If the difference between them is not so great as to cause motion of the "mass," it will cause some amount of pressure, or give rise to some amount of "molecular," or chemical or other motion.

In the next paragraph, (page 58), Mr. Spencer makes some remarks on another "ultimate scientific idea," on the relation of force to man's consciousness, and the contradiction involved on our ideas of such relation. He says:—

"On lifting a chair, the force exerted we regard as equal to that antagonistic force called the 'weight' of the chair; and we cannot think of these as equal without thinking of them as like in kind, since equality is conceivable only between things that are connatural. The axiom that action and reaction are equal and in opposite directions, commonly exemplified by this very instance of 'muscular effort' *versus* 'weight,' cannot be mentally realised on any other conditions. Yet, contrariwise, it is incredible that the force

as existing in the chair really resembles the force as present to our minds. It scarcely needs to point out that the weight of the chair produces in us various feelings, according as we support it by a single finger, or the whole hand, or the leg; and hence to argue that as it cannot be 'like' all these 'sensations' there is no reason to believe it like 'any.' It suffices to remark that since the force as known to us is an affection of 'consciousness,' we cannot conceive the force existing in the chair under the same form without endowing the 'chair' with 'consciousness,' so that it is absurd to think of force as in itself '*like*' our 'sensation' of it, and yet necessary so to think of it, if we realise it in consciousness at all."

Mr. Spencer says, "It is incredible that the force as existing in the chair really resembles the force as present to our minds."

The force acting in the chair, and the force acting in our muscles, are alike mechanical, alike "external" to the "I,"—the *Ego*. I am in the same way "conscious" of both. The difference is not in my "consciousness" of the two forces, but in the "origin" of the forces. On the one hand the force in the chair acts upon me; on the other, I, by means of my muscles, act upon the chair. Whether I resist the action of the chair-force by means of the muscle-force of my finger, or my whole hand, or my leg, my "consciousness" of action is the same; that is, of a strain upon some of my muscles. The greater the strength and number of muscles I can bring to bear upon the sustainment of the chair, the easier will be the act; the fewer and weaker, the more arduous. Also, my feeling will be modified by the mechanical conditions under which I act. But the "kind" of consciousness I feel, will in all the cases, be the same in kind. My being "conscious" makes no difference whatever between my force and the chair-force. The difference is not between the forces, but that the action of the chair does not cause "consciousness" in the *chair*, but the opposed action of

the chair and my muscles does, in the case adduced, cause "consciousness" in *Me*. My force, like that of the chair, is mechanical force. But in me, the force is *plus* "*consciousness*, *plus* "*intention*." In the chair "consciousness" and "intention" do not exist. But consciousness and intention are not necessarily,—not unavoidably present in myself, for—.

Let us suppose I am in bed and asleep. Suppose I have upon my right hand a steel gauntlet, weighing, say, two pounds. In my sleep I lift my hand to my head; in doing so I lift the two pounds, the "weight" of the glove. The glove is unconscious, so am I; our forces are alike—they are mechanical. I awake. Again I lift my hand to my head. The opposed forces are exactly the same as when I previously lifted the glove, but the *second* lifting, though the lifting is the same, is accompanied by "consciousness." It is *plus* consciousness.

"It suffices to remark," says Mr. Spencer, "that since the force as known to us is an affection of consciousness, we cannot conceive the force existing in the chair under the same form without endowing the 'chair' with 'consciousness.' So that it is absurd to think of force as in itself like our 'sensation' of it, [rather!] and yet necessary so to think of it if we realise it in consciousness at all."

"Since the 'force' as known to us is 'an affection of consciousness,'" it would be very nice if one could lift a chair, or anything else, by an "affection" of "consciousness."

The force we know is not "an affection of *consciousness*," but an affection of *Me*; the *result* of which is consciousness in *Me*. I think I have previously sufficiently discussed this matter of "consciousness," which is spoken of by Mr. Spencer as if it were in itself some kind of entity or thing, instead of a "state" of an "I." It is needless to say that the necessity for the absurdity of thinking that force in itself is "like" our sensation of it, does not exist.

We have already considered what Mr. Spencer advanced respecting the "solidity of Matter" and the "law of con-

tinuity" in relation to "intermediate velocities," and proceed to consider the paragraph immediately following that to which I have referred. It begins, (page 52)—

"The supposition that Matter is absolutely solid being untenable, there presents itself the Newtonian supposition that it consists of solid atoms, not in contact, but acting on each other by attractive and repulsive forces, varying with the distances. To assume this, however, merely shifts the difficulty. . . . The question still arises,—What is the constitution of these units? We have no alternative but to regard each of them as a small piece of matter. Looked at through a mental microscope each becomes a mass of substance such as we have been contemplating. Exactly the same enquiries may be made respecting the 'parts' of which each atom consists, while exactly the same difficulties stand in the way of every answer. And manifestly, even were the hypothetical atom assumed to consist of still 'minuter' ones, the difficulty would appear at the next step; nor could it be got rid of, even by an infinite series of assumptions."

The "difficulty" stated is of Mr. Spencer's own creation. Newton's hypothesis was clearly not intended by him to be "ultimate." He made no statement as to the "constitution" of the force-exercising atoms. It meant no more than any one would mean in stating his opinion that a wall consisted of or was built of bricks, but did not express any opinion whatever as to the nature and constitution of the said bricks. Newton considered his atom as a solid unity; whether he imagined it to consist of one piece only, or of many pieces co-existing, he gave no hint. It seems to me that Mr. Spencer's remarks are irrelevant, and had already been made in considering the infinite divisibility or non-divisibility of matter. A question which he decided to be "insoluble."

"Boscovich's conception yet remains to us. Seeing that Matter could not, as Leibnitz suggested, be composed of unextended monads, (since the juxta-position of an infinity of points having 'no extension' could not 'produce' that

'extension' which Matter possesses); and perceiving objections to the view entertained by Newton, Boscovich proposed an intermediate theory, uniting, as he considered, the advantages of both, and avoiding their difficulties. His theory is, that the constituents of Matter are 'centres' of 'force,'—'points' without 'dimensions,' which attract and repel each other in suchwise as to be kept at specific distances apart. And he argues mathematically, that the forces possessed by such centres might so vary with the distances, that under given conditions the centres would remain in stable equilibrium, with definite interspaces, and yet, under other conditions, would maintain larger or smaller interspaces. This speculation, however, ingeniously as it is elaborated, and eluding, as it does, various difficulties, posits a proposition which *cannot by any effort be represented in thought*; it escapes all the inconceivabilities above indicated by merging them in the one inconceivability with which it sets out. *A centre of force absolutely without extension is unthinkable.* Answering to those words, we can form nothing more than a symbolic conception of the illegitimate order.—[We can form no conception whatever—symbolic or otherwise. How can we form a conception of a conception which we cannot conceive at all?] The idea of resistance cannot be separated in thought from the idea of an extended body which offers resistance. To suppose that central forces can reside in points, not infinitesimally small, but *occupying no space whatever*—points having position only, with nothing to 'mark' their position—points in no respect distinguishable from the surrounding 'points' that are *not* centres of force; [—in the words of the catechism,—"which be they?"]—to, suppose this is utterly beyond human power.

"Here it may possibly be said, that though all hypotheses respecting the constitution of Matter commit us to inconceivable conclusions when logically developed, yet we have reason to think that one of them corresponds with the fact. Though the conception of Matter as consisting of dense

individual units is symbolic and incapable of being completely thought out, it may yet be supposed to find indirect verification in the truths of chemistry. These, it is argued, necessitate the belief that matter consists of particles of specific weights, and therefore of specific sizes. The general 'law of definite proportions' seems impossible on any other condition than the existence of ultimate atoms; and though the combining weights of the respective elements are termed by chemists their 'equivalents,' for the purpose of avoiding a questionable assumption, we are unable to think of the combination of such definite weights without supposing it to take place between definite numbers of definite particles. And thus it would appear that the Newtonian view is, at any rate, preferable to that of Boscovich. A disciple of Boscovich, however, may reply that his master's theory is involved in that of Newton, and cannot indeed be escaped. 'What,' he may ask, 'is it that holds together the "parts" of these ultimate atoms?' [If the atoms had "parts," how could they be "ultimate?"]. 'A cohesive force,' his opponent must answer. 'And what,' he may continue, 'is it that holds together the parts of any fragments into which, by sufficient force, an ultimate atom might be broken?' Again the answer must be—a cohesive force. 'And what,' he may still ask, 'if the ultimate atom were, as we can imagine it to be, reduced to parts as small in proportion to it, as *it* is in proportion to a tangible mass of matter—what must give each part the ability sustain itself and to occupy space?' Still there is no answer but—a cohesive force. Carry the process in thought as far as we may, until the extension of the parts is less than can be imagined, we still cannot escape the admission of forces by which the 'extension' is upheld; and we can find no limit until we arrive at the 'conception' of centres of force without any extension."

A curious conclusion. "A centre of force absolutely without extension," Mr. Spencer says, "is absolutely

unthinkable." Yet, in the last sentence of the paragraph just quoted, he says, "We can find no limit to the process [of reduction of the atom] until we arrive at the 'conception' of *centres of force without any extension*"! Are we to believe, then, that the process of division of an atom of matter may be carried so far that at last a division is made of a part so small, that though it must itself constitute a part of an atom, yet the result of its continuous division is the *destruction* of the "part;" that a division of a "one" instead of resulting in "two halves" results in "nothing?" It would seem that the belief that Matter is indestructible is a mistake, and that by a process of division, if repeated sufficiently often, Matter, may be reduced to nothing, may, in fact, be destroyed.

The next sentence terminates the paragraph. "Matter then in its ultimate nature is as absolutely incomprehensible as Space and Time. Frame what suppositions we may, we find in tracing out their implications that they leave us nothing but a choice between opposite absurdities."

Newton's hypothesis is not absurd. Boscovich's is. We have not had "opposite absurdities," but one "rational" supposition and two "absurdities." The one absurdity, that of Boscovich; the other, that an atom can be divided into nothing.

Mr. Spencer continues, "How, again, can we understand the connection between Force and Matter? Matter is known to us only through its manifestations of Force; our ultimate test of Matter is the ability to resist: abstract its resistance and there remains nothing but 'empty extension' [!] Yet, on the other hand, resistance is equally unthinkable apart from extension."

Such being the case, and it being certain that all our experiences of matter are really only "experiences" of "Force," the inference seems unavoidable that there is, in truth, no such thing as "Matter," that Newton's "solid" atom is not needed to explain the phenomenon we call Matter, but in

reality hinders us from perceiving the true explanation. As Boscovich's explanation postulates what we are not able to conceive—"a centre of force without extension"—we cannot accept it. It would seem, however, that a mode of explanation of the phenomena presented by Matter lies right before us. It is the hypothesis, that an atom, (the explanation of an "atom" would be the explanation of "Matter,") consists, not of a "centre" of force *without* extension, but "a *Sphere* of force" *with* whatever amount of "extension" and modes of extension and modes of action an explanation of the phenomena of Matter demands.

I have called the atom a "Sphere of Force," but I do not think such is the right word. I think "force" has no existence at all of itself, but is a product of something else—the ultimate something—and its name is *not force*, but *power*. Force is the result of the action of power. Force is, from its very nature, always active; power is not.

I can only suppose all its modes of action to be either action of attraction or of repulsion, and their interactions. All the phenomena presented by matter must result from these. I cannot do better than quote Boscovich's argument in support of his hypothesis of centres of force without extension, as set forth by Mr. Spencer.

Substituting "spheres of force" for "centres of force," all he advances may, I think, be accepted as constituting a true theory of atoms.

Boscovich's theory is, (quoting from page 53), "That the constituents of matter are centres of force [spheres of force] —points without dimensions [spheres *with* dimensions] which attract and repel each other in suchwise as to be kept at specific distances apart. And he argues mathematically, that the force possessed by such centres [spheres] might so vary with the distances that under given conditions the centres [spheres] would remain in stable equilibrium with definite interspaces, and yet, under other conditions, would maintain larger or smaller interspaces. This speculation, however,"

Mr. Spencer remarks, "ingeniously as it is elaborated, and eluding, as it does, various difficulties, posits a proposition which cannot by any effort be represented in thought; it escapes all the inconceivabilities above indicated *by merging them in the one inconceivability* with which it sets out. A centre of force absolutely without extension is unthinkable. . . . To suppose that central forces can reside in points, not infinitesimally small, but occupying no space whatever,—points having position only, with nothing to mark their position,—points in no respect distinguishable from the surrounding points that are not centres of force;—to suppose this is utterly beyond human power."

To the hypothesis of "spheres" of "force" none of these objections can, I think, be made; and until I meet with, or myself think of some valid objection, I shall hold that *an atom is a sphere of force or power in non-resisting space.*

If an atom really consists of force or power alone, then all the difficulties respecting the "inconceivabilities" of the interaction of force on matter, and also of matter upon mind and of mind upon matter, vanish. For *mind* must either be the result of interactions and collocations of known forces, or it must be a *force in itself.* Either way, interaction of matter and mind and of mind and matter, are placed upon the same footing as that of matter upon matter, which really means, of force upon force. The question of mind and other forces ceases to be,—can they act upon each other? but, is "*mind*" a force which has been "*added*" to the sum of previously existing forces, or only a "*collocation*" or "*combination*" of *forces* "*already existing.*"

But supposing matter to be only another name for force, then must "force" be said to be indestructible? For "matter" is said to be indestructible. But *is* matter indestructible? Mr. Spencer devotes a short chapter, commencing at page 172, to "The Indestructibility of Matter." He begins,—

"Not because the truth is unfamiliar, is it needful here to

say something concerning the indestructibility of matter. . . . Could it be shown, or could it with any rationality be even supposed, that matter, either in its aggregates or in its units, ever became non-existent, there would be need either to ascertain under what conditions it became non-existent, or else to confess that science and philosophy are impossible. For if, instead of having to deal with fixed quantities and weights, we had to deal with quantities and weights which were apt, wholly or in part, to be annihilated, there would be introduced an incalculable element, fatal to all positive conclusions. Clearly, therefore, the proposition that matter is indestructible must be deliberately considered.

Page 177.—"Conceive the space before you to be cleared of all bodies save one. Now imagine the remaining one not to be removed from its place, but to lapse into nothing while standing in that place. You fail. The space which was solid you cannot conceive becoming empty, save by the transfer of that which made it solid. What is termed the ultimate incompressibility of matter is an admitted 'law of thought.' However small the bulk to which we conceive a piece of matter to be reduced, it is impossible to conceive it 'reduced' into nothing. While we can represent to ourselves the parts of the matter as approximated, we cannot represent to ourselves the quantity of matter as made less by 'compression.' To do this would be to imagine some of the constituent elements '*compressed*' *into nothing*, which is no more possible than to imagine compression of the whole into nothing."

I must beg leave to differ from Mr. Spencer.

Mr. Spencer says, "Now imagine the remaining one body to lapse into nothing. You fail." Indeed I do not. I have not the slightest difficulty in supposing it not to "lapse" into "nothing," as there is no such thing as "nothing," *but to "cease" to "be."* But that is the limit of my supposition. I do not suppose it to lapse into "nothing," as if "nothing" was what it "became" when it "ceased to be,"

but simply that it *ceased to exist*. And the ultimate incompressibility of matter is not a "law of thought," but a "fact in physics." For how can a "fact" in "physics" be a "law" of "thought?"

Also, Mr. Spencer erroneously credits me with supposing I know "*how*" *the* "*ceasing to be*" *was* "*effected.*" Mr. Spencer says, "However small the bulk to which we conceive a piece of matter '*reduced*,' it is impossible," he says, "to conceive it 'reduced' to nothing. [Of course, I do not suppose it was by a "process" of reduction that the ceasing to be was effected, but only the "fact" of cessation of existence; though Mr. Spencer speaks of "reducing" atoms by repeated division to "centres of force without extension."· Which looks like "nothing."] It is impossible to think of something becoming nothing, for the same reason that it is impossible to think of nothing becoming something—the reason, namely, that nothing cannot become an object of consciousness. [Most certainly not; but I never entertained any such notion. My assertion never implied any "becoming" at all. The word "becoming" means a process of something changing into something else: a something cannot "become" a "nothing." And my supposition was a "cessation," not a "becoming."] The 'annihilation' of matter is unthinkable, for the same reason that the 'creation' of matter is unthinkable."

"Unthinkable," as to understanding the *process* of annihilation or of creation, but needing only the supposition of some adequate cause to be entirely *believable*. There is, indeed, *one thing* which I cannot even "*suppose*" to be destructible. But it is not matter or force, but a thing we have already discussed, and that is—Space.

Page 179 (last paragraph of the chapter).—"Thus, then, by the indestructibility of matter we really mean the indestructibility of the *force* [Mr. Spencer's italics] with which matter affects us. As we become conscious of matter

only through that resistance which it opposes to our muscular energy, so do we become conscious of the permanence of matter only through the permanence of this resistance, either as immediately or mediately proved to us."

In the chapter on "ultimate scientific ideas," which we have been considering, there are several things which can better be treated in other places. It will be sufficient to simply mention them here. They consist of the difficulties belonging to the direction of motion; the theory of a "luminiferous ether" pervading space; of "gravity," and the difficulty of conceiving the mode of its action; of "consciousness," as constituted by a series of successive states, which belongs rather to metaphysics than to physics; and what is the nature of the "substance of that which thinks."

The conclusions at which Mr. Spencer arrives from his analysis of Space and Time, are "That Space and Time are utterly incomprehensible. The immediate knowledge which we seem to have of them proves, when examined, to be total ignorance. While our belief in their objective reality is insurmountable, we are unable to give any rational account of it. And to posit the alternative belief (possible to state, but impossible to realise) is merely to multiply irrationalities."

I hope I have shown that Mr. Spencer's conclusions are incorrect, because drawn from erroneous premises. Mr. Spencer *assumes* that space and time are *alike* "objective," or *alike* "subjective;" are *alike* entities, or *alike* non-entities. Whereas space is an entity or an objective something, and time is "subjective"—a thought about duration of a thing or things, or a combination of things. The idea of *both* being subjective or *both* objective, while one—space—is objective, and the other—time—is subjective, could hardly fail to "multiply irrationalities." But the "irrationalities" do not arise from any inherent necessity, but from Mr. Spencer's error.

At page 48 of his work, Mr. Spencer touches a real difficulty, but not a difficulty involving any contradiction—any "irrationality," but only a fact. Speaking of extension as being the "only attribute of space," he says, "it implies a confusion of thought. For 'extension' and 'space' are convertible terms; by 'extension,' as we ascribe it to surrounding objects, we mean occupancy of space; and thus, to say that 'space' is 'extended,' is to say that space 'occupies' space." This real "difficulty" I shall consider later on.

The "contradiction" of space occupying space does not arise. It is not a "contradiction," but a question of fact, whether space *is* "occupied" by matter, or is not. It does not touch the question of *un-finiteness*, but only whether it is space that is unlimited, or space and matter that together are unlimited. Whatever conclusion we reach there is *un-finity*. Till we have further considered the question I shall consent to the view that space is occupied by matter and is unlimited.

Our immediate knowledge of Space and Time "being examined" does not turn out to be "total ignorance." We find no sign of "multiplied irrationalities," or of any "irrationality" at all.

"That matter is either indivisible, or it is not," we, like Mr. Spencer, find to be an insoluble question. "Insoluble" not because the question involves any "irrationality," but because we have not such knowledge respecting the nature of matter as is necessary to enable us to come to a decision either way.

Although we are ignorant of the constitution of matter, we at once, with Mr. Spencer, reject Boscovich's hypothesis of centres of force—mathematical points without extension, as constituting the ultimate elements of matter; which hypothesis certainly involves about as great an "irrationality" as one can well imagine. But, then, no one holds that doctrine, so "irrationality" does not arise.

The hypothesis I have advanced, that ultimate elements

consist of "Spheres of Force" or Power, I shall work out and submit to the consideration of the reader.

"Matter," Mr. Spencer says (page 54), "in its ultimate nature, is as absolutely incomprehensible as space and time. Frame what suppositions we may, we find on tracing out their implications that they leave us nothing but a choice between opposite absurdities."

We have not been considering the *ultimate "nature"* either of space or matter, which is a thing no one, I should think, would dream of attempting, unless, indeed, he possessed the knowledge of what is called "things in themselves," but only the correctness of various opinions respecting them. When any opinion is advanced which is not congruent with facts, the reasoning from them is likely to lead to "opposing absurdities," such as I think we have already witnessed. But when the premises are erroneous, the "absurdities" may be relegated to the same category. On the other hand, to own, when such data as may be necessary to the forming of an accurate judgment are absent, a confession of ignorance, a recognition that a given question is—for the present, at any rate—insoluble, cannot rightly be called an "absurdity."

The next question—as to the true direction of a given motion—I have not here touched upon, as it may be considered under more favourable circumstances by-and-bye.

The transfer of "*motion*" we found to be a wrong statement. Motion, being a state of a body, cannot be transferred at all. But the "force," of which the "state" called "motion" is an effect, can be, and is, transferred from one body to another, which presents no difficulty and gives rise to no "absurdity" or "irrationality."

The alleged "puzzle" concerning the connection of motion and rest, we found to be due to the imaginary "intermediate velocities," arising from a non-recognition of the fact that not motion is transferred from one body to another, but force, and

that the cessation of motion is contingent upon the neutralisation or destruction, by some other and adequate force, of the force which caused the motion. The rate of velocity decreases according to the rate of the expenditure or destructive neutralisation of the force. If a body moving at the rate of a hundred miles an hour meet with another body able to totally neutralise its force instantaneously, instantaneously it will stop. Neutralise its force in half an hour, it will move half an hour and then stop.

Considered as Mr. Spencer has considered them, it is not surprising that we should encounter "alternative impossibilities." But like the other "irrationalities" and "absurdities," they are purely imaginary.

Mr. Spencer winds up his discussion of the "luminiferous ether" and gravity—which we have to consider in the future—by saying, very gravely:—

"While, then, it is impossible to form any idea of force in itself, it is equally impossible to comprehend its mode of exercise."

That "it is impossible" to form any idea of "*force in itself*," no one will dispute. But that it is impossible to comprehend at least some of its modes of exercise, will, I think, be denied by every one. *For the "modes" of exercise of force form the totality of human experience.* In fact, it is the only knowledge we possess; except such as may be legitimately inferred from such knowledge, and which constitute "hypothetic" modes of action of force, and are verifiable or or not verifiable, according to their truth or error, always supposing the seeker to have at his command the means of verification.

In the closing paragraph of the chapter (page 66), Mr. Spencer says:—

"Ultimate scientific ideas, then, are all representative of realities which cannot be comprehended. . . . Supposing him (the man of science) in every case able to resolve the appearances, properties, and movement of things into mani-

festations of Force in Space and Time, he still finds that Force, Space, and Time pass all understanding. . . . In all directions his investigations eventually bring him face to face with an insoluble enigma; and he ever more clearly perceives it to be an insoluble enigma. . . . He realises with a special vividness the utter incomprehensibleness of the simplest fact, considered '*in itself*.' He, more than any other, truly *knows* that in its *ultimate essence* nothing can be known."

Which means, that all our knowledge is of Phenomena, and that knowledge of things in themselves is impossible: a fact with which philosophy and science have been supposed to be familiar thousands of years ago. Ultimate scientific ideas are Thoughts about "Phenomena;" and if all Phenomena may be said to be effects of Force or Power it behoves us to strive to gain all possible knowledge of their modes of action.

Mr. Spencer's supposition of the man of science having resolved the appearances, properties, and movements of things into manifestations of force "*in*" space and "time" needs correction. Time not being a thing, but only a name for our recognition of duration of existence, manifestations cannot take place "*in*" it,—as, I hope, I have sufficiently shown. Instead of three ultimate categories, there are only two—Space and Force. Space and Force constitute the sum of things, that is, if we are of opinion that matter is only another name for force or power.

If we do not seem able to gain any further knowledge of Space, seeing it manifests itself in only one way, yet to the increase of our knowledge of the modes of manifestation of Force there would seem to be no end. So far as we have gone, we have found no "necessary absurdities" or "irrationalities" in the manifestations of the phenomena of force, though we have found many things we could not understand. If ever we have found what seemed "absurd," "irrational," "impossible," "contradictory," careful consideration has

shown us that such "absurdities," "irrationalities," "impossibilities," "contradictions" have been the result of reasoning from erroneous premises, or from ignorance. It is not possible for absurdities or irrationalities to be present in physics; it is only man's *thoughts* and *reasonings* that can be absurd or irrational.

In Space and Force or Power, we seem to have reached the largest possible expression of existences. At page 169, Mr. Spencer says:—

"We come down, then, finally to Force as the ultimate of ultimates. Though Space, Time, Matter, and Motion are apparently all necessary data of intelligence, yet a psychological analysis (here indicated only in rude outline) shows us that these are either built up or abstracted from *experiences of force*. Matter and Motion, as we know them, are differently conditioned manifestations of Force. Space and Time, as we know them, are disclosed along with these different manifestations of Force, as the conditions under which they are presented."

It certainly cannot rightly be said that *Space* is either "built up" or "abstracted from" "experiences" of "Force." On the contrary, it is derived from the very opposite—from our experiences of the *absence* of Force. And if Space—Mr. Spencer says "space" and "time"; I, of course, deny the "time"—and if space is "disclosed" with these different manifestations of force, as the "condition under which they are presented," then, as anything which is the "condition" of the manifestation of some other thing *must exist before that other thing can possibly manifest itself*, then instead of their being two "ultimates," there is only one, and that ultimate is not Force, but Space. That is, what we call Space must have existed *before* Force; and Force is not original, but derived—that is to say, Force is in some way a "product" of Space. An unavoidable conclusion, and borne out by our thoughts about Space and Force. For we *can* suppose the non-existence of Force, but we *cannot* suppose the non-existence of Space.

Space, *or something existing in Space, must have produced Force;* for a thing cannot cause itself.

But do we know as much of Force as it is possible to know? It may be well to carefully consider the present dicta of Science and Philosophy upon the subject as set forth by Mr. Spencer.

CHAPTER VI.

THE CONTINUITY OF MOTION.

INDESTRUCTIBILITY OF FORCE—TO UNDEVELOPED MINDS SUPPOSED DESTRUCTIBLE—"MOTION" DEFINED AS A "SERIES" OF "POSITIONS" OCCUPIED IN SUCCESSION—CRITICISM OF—ANOTHER DEFINITION—EUCLID'S DEFINITION OF A POINT, A LINE, ETC.—MR. J. S. MILL'S DENIAL OF THE TRUTH OF SUCH DEFINITIONS—CRITICISM, SHOWING THE SENSE IN WHICH THEY ARE TRUE—ALL MOTIONS THE RESULT OF COMPULSION; THE SEVERAL FORCES OR POWERS OF NATURE—THE SEVENTY ELEMENTAL ATOMS—"THAT FORCE IS NEVER REALLY LOST" IS THE DOCTRINE OF THE "CONTINUITY OF MOTION"—STATEMENT OF—PUSHING AGAINST A DOOR—RAILWAY CARRIAGE—INDIA-RUBBER STRING—ALL "PROOFS" OF THE CONTINUITY OF MOTION INVOLVE THE POSTULATE THAT THE "QUANTITY OF FORCE IS CONSTANT."—OBJECTIONS—PROFESSOR P. G. TAIT ON LOSS OF HEAT IN CONVERTING ICE INTO WATER, STEAM, GAS—MR. SPENCER ON THE RAISING OF VAPOUR BY THE SUN'S ACTION—THE FUNCTION OF GRAVITY IS TO "AGGREGATE;" THE FUNCTION OF HEAT IS TO "SEPARATE" OR "SPLIT"—BODIES DO NOT "ABSORB" HEAT, BUT HEAT "PENETRATES" BODIES—BODIES DO NOT "RADIATE" HEAT, BUT HEAT RADIATES ITSELF—IT IS NOT THE SUN, BUT GRAVITY THAT "LIFTS" VAPOUR.

We have already given some consideration to the belief in the Indestructibility of Matter, and concluded that although we do not know of any instance of the destruction of matter, we yet concluded that its "ceasing to be" was "supposable;" and, so far, differing from Space, which we cannot even *suppose* to "cease to be."

If Matter be really Force or Power, and Matter is indestructible, it necessarily follows that Force is indestructible.

By Matter, I do not mean a something which "possesses" or is endowed with force, but an entity consisting *of* Force or Power; not a something *plus* Force, but force *alone;* that an atom is a sphere *consisting* of Force or Power.

On the same page, (169) from which I last quoted, Mr. Spencer says:—

"Thus all other modes of Consciousness are derivable from

experiences of Force; but experiences of Force are not derivable from anything else."

That is, that Force is not derived, but Original.

In the first paragraph of the chapter on "The Continuity of Motion," Mr. Spencer writes (page 180):—

"Like the Indestructibility of Matter, the Continuity of Motion, or, more strictly, of that something which has motion for one of its sensible forms, is a proposition on the truth of which depends the possibility of exact science, and therefore of a philosophy which 'unifies' the results of exact science. Motions, visible and invisible, of masses and molecules, form the larger half of the phenomena to be interpreted; and if such motions might either proceed from nothing or lapse into nothing, there could be no scientific interpretation of them.

" . . . But to undeveloped minds the opposite seems self-evident. The facts that a stone thrown up soon loses its ascending motion, and that after the blow its fall gives to the earth it remains quiescent, apparently prove that the 'principle of activity'* which the stone manifested may disappear absolutely. . . . All men once believed, and most believe still, that 'motion' can 'pass' into 'nothing,' and ordinarily does so pass. But the discovery that the planets move round the sun with 'undiminishing speed' raised the suspicion that a moving body, when not interfered with, will go on for ever, without change of velocity; and suggested the question whether bodies which 'lose' their motion do not at the same time 'communicate' as much motion to other bodies. It was a familiar fact that a stone would glide further over a smooth surface such as ice than

* "Note [by Mr. Spencer].—Throughout this chapter I use this phrase, not with any metaphysical meaning, but merely to avoid foregone conclusions." [Of course, the phrase is interchangeable with force, and is so interchanged in the next chapter, which is on the "Persistence of Force."]

over a surface strewn with small objects; that a projectile would travel a far greater distance through a rare medium like air, than through a dense medium like water; . . . that the molar motion which disappears when a bell is struck by its clapper, reappears in the bell's vibrations and in the waves of air which they produce; that when a moving mass is stopped by coming against a mass that is immovable, the motion which does not reappear in sound, reappears as molecular motion; and that, similarly, when bodies rub against one another, the motion lost by friction is gained in the motion of molecules. But one aspect of this general truth, as it is displayed to us in the motions of masses, we must carefully contemplate; for, otherwise, the doctrine of the 'Continuity of Motion' will be entirely misapprehended."

But before we do so, it will be well to note Mr. Spencer's statement as to our conception of motion. At page 167, Mr. Spencer says:—

"The conception of motion, as presented or represented in the developed consciousness, involves the conceptions of space, of time, and of matter. *A something that moves; a 'series of positions occupied in succession;'* and a group of *co-existent* positions united in thought with the successive ones—these are the constituents of the idea. . . . A certain other element of the idea, which is in truth its fundamental element, (namely, *the necessity which the moving body is under to go on 'changing' its position*), results immediately from the earliest experiences of force."

I have already endeavoured to show that motion is not a thing, but a state; a state of a body consequent upon the action of some force present in it, *the final effect* of which is a *change of position*. But has a body *while "moving" any "position" at all? To be in a "position" a body must be at "rest."* Before it began to move, it was in a "position;" when it ceases to move, it is in a new "position." But how is it possible for it to be in a "position" *while* it is moving? While a body is moving, it is moving *from* one position *to*

another. "Moving" is the means by which such change is effected. That "motion" is a continuous, not an intermittent state, so does not admit of a single position, let alone a "series of positions." Take the minute hand of a watch. I take the minute hand because its motion is a perceivable motion. Let it describe a complete circle. During that time it has been in sixty positions, for there has been a *cessation of motion* at every second. But suppose my watch to be ten minutes slow. I apply my key to the axle of the minute hand, and *continuously* move the pointer forward ten minutes. How many "positions" did the pointer occupy while I so moved it? None at all! Suppose I moved it from twenty minutes to twelve to ten minutes to twelve. Two positions are expressed—"twenty minutes to twelve," "ten minutes to twelve." What positions did it occupy between these two positions? None: it was "moving." It was moving from one position to another. Roughly speaking, it was changing its position, but the change was not "effected" till the pointer stopped at ten minutes to twelve; till it reached the position ten minutes to twelve it was only in *process* of being effected. Motion is a state of a body which has left one position and is not yet in any other position.

But it may be objected that such a body in the state described is "nowhere!" Exactly: it *is* "*nowhere;*" but because it is not in a state of rest, or in a "position," or is "nowhere," it is not, therefore, "non"-"existent." The word "where" means "place" or "position." If any one enquires about the "position"—about the "place"—about the "whereabouts" of a thing, he says, "where" is it? If the thing enquired about happens to be "moving," then, in order to localise it, to give it a "place" or "where," a stationary *locale*, sufficiently extensive to *include the extent of the motion of the thing*, is given. "Where" is James? He is running in that "field," or rowing on the "lake." "Where" is the canary? Flying about in the "dining-room." Ah, there it has

settled on the top of the bookcase—it has "placed" itself. As you cannot say "here" of a moving body, as you cannot say "there" of a moving body, so you cannot say "where" a moving body is; and as there are only two possible positions on which a thing can be, and we say of a thing it is neither "here" nor "there," why then it is "no "where? If there be something that moves, and in a "series" of "positions," every one of these positions necessarily implies a *cessation* of motion, and therefore cannot rightly define what motion *is*.

And what does "cessation" of motion imply?

A body moves because it is compelled to move. Its motion is the effect of a conflict of unequal forces. If the body ceases to move, it is because the force which was previously sufficient to compel it to move has, from some cause or other, become insufficient; and having ceased to move, it has a position.. If motion recommences, it is because such force has been communicated to it as to "compel" motion, it has been "*forced*" to move; and the motion will continue until the force becomes inadequate, and can no longer "force" it to move. Suppose we again make use of the cannon ball which was projected with an initial velocity of two thousand feet a second. We will suppose it to be capable of moving five miles before it stops. We will suppose it has travelled one mile. If it has "occupied a series of positions" during its transit, it must, each time, have have stopped in order to occupy the "series of positions." For every such "stoppage" there must have been an assignable and sufficient cause; if it stopped, there must have been some cause for its stopping. Why did it stop? and if it did stop, what was the cause of the "recommencement" of motion? What "stopped" it? and whence came the force that set it going again? I think we have no choice but to reply that both cessation of motion and recommencement of motion were alike imaginary.

At page 182, Mr. Spencer refers to the case of the

pendulum, which, "with speed now increasing and now decreasing, the pendulum alternates between extremes at which motion ceases. . . . Though the pendulum comes to a "momentary rest" at the end of each swing, and then begins a reverse motion, yet the oscillation, considered as a whole, is continuous—friction and atmospheric resistance being absent, this alternation of states will go on for ever."

Mr. Spencer, though here he speaks of a "a something that moves," says nothing of any "series of positions occupied in succession," but describes the motion as "continuous," which is somewhat surprising, seeing that he says of the pendulum that it "comes to a momentary rest." Now it would seem, that if the "motion be continuous," the idea of even a 'momentary rest' cannot be conceivable: a continuous motion which "rests" while it "moves" is a contradiction; it certainly looks very like it. But the contradiction is only seeming, not real, for the motion *is* continuous. In order to make this clear it will be necessary to consider what the proposition "that a line is length without breadth," really means; but first, we had better note some of the "definitions" of the "First Book of Euclid."

"1. A *point* is that which has no parts, or which has no magnitude. (But it has *position*.)

"2. A *line* is length without breadth.

"3. The *extremities* of a line are points.

"4. A *straight* line is that which lies evenly between its extreme points. (Also called a *right* line.)

"5. A *superficies* (or surface) is that which has only length and breadth.

"6. The *extremities* of a superficies are lines.

"13. A term or *boundary* is the "extremity" of anything.

"14. A *figure* is that which is enclosed by one or more boundaries.

"15. A *circle* is a plane figure contained by one line, which is called the *circumference*, and is such, that all straight lines

drawn from a certain point within the figure to the circumference are equal to one another."

Mr. Mill, in his "System of Logic" (vol. i., page 259, tenth edition), expresses himself very strongly in regard to the above definitions. He says:—

"... There exist no real things exactly comformable to the 'definitions.' There exist no points without magnitude; no lines without breadth, nor perfectly straight; no circles with all their radii exactly equal, nor squares with all their angles perfectly right. ...

"... The points, lines, circles, and squares which any one has in his mind, are, I apprehend, simply copies of the points, lines, circles, and squares he has known in his experience. Our idea of a point I apprehend to be simply our idea of the *minimum visible*, the smallest portion of surface which we can see. *A line, as defined by geometers, is wholly inconceivable.* We can reason about a line as *if* it had no breadth. ... But we cannot *conceive* a line without breadth; we can form no mental picture of such a line. All the lines we have in our minds are lines possessing breadth. If any one doubts this, we may refer him to his own experience."

To "experience," then, we will go. And first, as to the meaning of the word "straight." I look at the edge of the sheet of paper on which I am writing. I look at it from top to bottom. As my eye travels I cannot perceive that the edge *deviates* either to the right or to the left: I, therefore, call it "straight." Anything which on the whole of its length deviates neither to the right nor to the left, that I call "straight." But some one may say,—"Oh yes, that sounds true enough, but take a powerful magnifying glass, and examine the edge of the sheet of paper, and you will find that it is full of 'deviations'—some small, some great, and the edge is not 'straight' at all, but 'crooked.'" Quite true; but it does not affect what I affirmed. The edge I see by means of the magnifier is not the edge I saw

"before." The line I see *now* is crooked, but the line I saw *before* was straight. I know straight only as the opposite of crooked. Whatever appears to me to be straight, *is* straight, so far as my thought about it is concerned, which means that I cannot "perceive" any deviations in its direction, and I have an absolute conception of straightness.

"A line is that which has length without breadth," which Mr. Mill affirms to be "wholly inconceivable."

Let us clearly understand that it is principally a question of seeing and "thought" about what we see. Mr. Mill says, "We can form no mental picture of such a line; all the lines we have in our minds are lines possessing breadth." Quite true. We cannot form a "picture" of a "line," but we can form a picture of two differently-coloured extents of surface which are in conjunction and which mutually "limit" each other. What we call a sensation, is the consciousness of some kind of difference. The difference here is that between the, say, blue of the one mass of colour and the yellow of the other. The sensation is that of blue and of yellow. We suppose them to perfectly coincide: there is, consequently, not anything *between* them, not anything which *separates* them, except the difference of their colours, which does not "separate," but "differentiates" them, thereby showing their "union." A line is simply a perception of the junction of limits of two different colours or bodies which *exactly coincide*. If the "limits" coincide without deviating right or left, the line is a straight line. We may call perception of things mutually limiting each other, their "line" of union, and also their "line" of difference; for although the two bodies or colours are "united," inasmuch as their limits mutually touch, yet their colours or substances are "different." Things are not "separated" by a "line," for it has no breadth. Its length is only the name for our perception of the extent of the two mutually-limiting colours or substances. It is hardly necessary to point out that we cannot form pictures of

sensations. A "circular" line, a "straight" line, a "crooked" line, etc., are *thoughts about "directions" of "limitations."* For instance, two men give their opinion about a line. One of them, whose business is such as to lead to close observance of directions of lines or limitations, says, "The line is crooked." The other, who has had no such training, says, "It is straight." A microscopical examination proves it to be crooked. The "thought" of the first man was more correct than that of the other. Many of the errors respecting the inconceivability of a line which shall have no breadth have, no doubt, arisen from the erroneous belief that one can *draw* a line. It is impossible to "draw" a line—that is, *a* line: when our intention is to draw only one line, we really draw two. Let any one take a pencil and draw a thickish line—which need not be straight—upon white paper, and examine it. It will at once be seen that each side of the so-called line coincides with and limits and is limited by the white of the paper on which it is drawn. It is impossible to draw a line which shall be so thin as to have *only one side.* Each side limits and is limited by the white of the paper on which it is drawn. Let the reader cast his eye about the objects in the room, and he will at once perceive by the way in which—no matter of what shape—they mutually "limit" each other, will perceive how it is that a line has length without breadth. The line itself is consequent upon our sensation of one thing being limited by some other thing, and its length the continuous direction of such limitation. When Mr. Mill affirmed that "we cannot conceive a line without breadth," he was evidently thinking of such a line as we "draw," and which is not one, but two lines; hence his error.

Now the instance of the "continuity of motion" during the oscillations of a pendulum *not* being broken by any "momentary rest" at its turning point, is exactly similar to the "supposed" separation of things by a "line" which has no breadth. The blue and the yellow which mutually

limited each other by a line *without* breadth, formed "together" a "continuous" surface—"continuous," because there was no interval between the cessation of the blue and the beginning of the yellow; so the change of direction of the motion of the "bob" of the pendulum was not "separated" by any real "interval of rest"—any real division. Any cessation of "substance," on the one hand, or any cessation of "motion," on the other, would be alike imaginary.

It may not be amiss to add a word or two on the other "definitions" named above.

A *point* is the junction of two meeting or crossing lines. The lines being length without breadth, cannot, when they meet, produce anything which has length or breadth.

A *surface* is where one body ends and some other body begins—or, if not body, space begins,—their coincidence being perfect.

A *figure* is that which limits and is limited by other bodies or space in two, or more, or in all directions.

We return to Mr. Spencer's discussion of "the continuity of motion."

All motions are compulsory and the result of force, either inherent or communicated.

What are the principal forces of which we have knowledge? It will be well to enumerate them as correctly as I can:—

Gravity; which acts without any cessation.—Cohesion.—Chemical affinity, attractive and repulsive.—Elasticity.—Light.—Heat.—Electricity.—Magneticity.—Polaricity; and, shall we say—Life?

The seat of these forces or powers is the seventy kinds of elemental—that is, undecomposable—atoms of which we have knowledge.

The last sentence quoted from Mr. Spencer, previous to our consideration of motion, and of some of the definitions of geometry," was,—page 181 of "First Principles,"—

"But one aspect of this general truth (that bodies communicate as *much* motion as they *lose*;—that molar motion which disappears in one way, reappears in some other, and *is never really lost*), as it is displayed to us in the motions of masses we must carefully contemplate; for, otherwise, the doctrine of the 'continuity of motion' will be entirely misapprehended."

I now proceed with next paragraph.

"As expressed by Newton, the first law of motion is, that every body must persevere in its "state" of rest or of uniform motion in a straight line, unless it be compelled to change that 'state' by forces impressed upon it."

It is pleasant to find Newton using the word "state" as the expression of the phenomenon of "motion" in the same sense as we have ourselves used it.

"With this truth may be associated the truth that a body describing a circular area round a centre which detains it by a tractive force, moves in that orbit with undiminished velocity."

The words to be specially noticed are "persevere" and "undiminished."

Mr. Spencer continues, "The first of these abstract truths is never realised in the concrete; and the second of them is but approximately realised. Uniform motion in a straight line implies the absence of a resisting medium. . . . So, too, the maintenance of a 'circular' orbit by any celestial body implies both that there are no perturbing bodies, and that there is a certain exact adjustment between its velocity and the tractive force of its primary; neither requirement ever being conformed to. In all actual orbits, sensibly elliptical as they are, the velocity is sensibly variable. And along with great ellipticity there goes great variation.

"To the case of celestial bodies, which, moving in 'eccentric' orbits, display at one time little motion and at another time much motion, may be joined the case of the pendulum. With speed now increasing and now diminish-

ing, the pendulum alternates between extremes at which motion ceases. [I have endeavoured to show that the motion does not cease.]

"How shall we so conceive these allied phenomena as to express rightly the truth common to them? The first law of motion, nowhere literally fulfilled, is yet, in a sense, implied by these facts which seem at variance with it. Though in a 'circular' orbit the 'direction' of the motion is continually being changed, yet the 'velocity' remains unchanged. Though in an 'elliptical' orbit there is now acceleration and now retardation, yet the average speed is constant through successive revolutions. Though the pendulum comes to a 'momentary rest' at the end of each swing, and then begins a reverse motion, yet the oscillation, considered as a whole, is continuous;—friction and atmospheric resistance being absent, this alternation of states will go on for ever."

What, then, do these cases show us in common?

To which the reply is obvious. *They show the continuous action of "gravity."* In the cases of the "circular and elliptical motions of celestial bodies round tractive centres,' the motion being in vacuo, and friction and atmospheric resistance being absent, and *gravity* being a *continuous* force—their motions we may say—will last for ever. In the case of the moving pendulum, friction and atmospheric resistance being present, will sooner or later bring it to rest, and the action of gravity will manifest itself in the "*pressure*" of the suspending hook upon the ring.

But let us see what reply Mr. Spencer gives to the question he has propounded.

"That which vision familiarises us with in motion, and that which has thus been made the dominant element in our conception of motion, is not the element of which we can allege 'continuity.' [We have seen that the motion *is* continuous while it lasts.] If we regard 'motion' simply as 'change of place,' then the pendulum shows us that the rate

of change may vary from instant to instant, and that ceasing at intervals it may be afresh initiated.

"But if what we may call the 'translation-element' in motion is not continuous, what is continuous? If, watching, like Galileo, a swinging 'chandelier,' we observe, not its isochronism, but the recurring 'reversal' of its swing, we are impressed with the fact that though at the end of each swing the 'translation' through space [the "motion"] ceases, yet there is something which does not cease, for the translation [motion] recommences in the opposite direction. [The force, gravity does not cease, and consequently the motion does not cease.] And on remembering that when a violent push was given to the chandelier it described a larger arc, and was a longer time before the resistance of the air destroyed its oscillations, we are shown that what continues to exist during these oscillations *is some correlative of the muscular effort which put the chandelier in motion.* The truth forced on our attention by these facts and inferences is, that translation through space is not in itself an *existence* [Mr. Spencer's italics. I suppose Mr. Spencer finds it impossible not to recognise that motion, or—as he is pleased to call it—"translation through space" is not a "thing," but a "state"]; and that hence the cessation of motion considered simply as 'translation,' is not the cessation of an existence, but is the cessation of a certain *sign of an existence* [Mr. Spencer's italics]—a sign again occurring under certain conditions. [Yes; and that "existence" is the "force" that causes the "motion."]

"Still there remains a difficulty. If that element in the chandelier's motion, of which 'alone' we can allege continuity, is the 'correlative' of the 'muscular effort' which moved the chandelier, *what 'becomes' of this element at either 'extreme' of the oscillation?* Arrest the chandelier in the 'middle' of its swing, and it gives a blow to the hand—exhibits some principle of activity [force], such as muscular effort can give. But touch it at *either turning-point*, and it

displays no such 'principle of activity.' This has 'disappeared' just as much as the translation through space has disappeared. How, then, can it be alleged that though the 'motion' through space is *not* continuous, the 'principle of activity' implied by the motion *is* continuous?

"Unquestionably the facts show that the principle of activity continues to exist under some form. When *not perceptible* it *must be* '*latent.*' 'How' is it 'latent?' A clue to the answer is gained on observing that though the chandelier when seized at the turning-point of its swing gives no impact in the direction of its late movement, it forthwith begins to pull in the 'opposite' direction; and on observing, further, that its pull is great when the swing has been made extensive by a violent push. Hence the *loss of* '*visible*' *activity* at the highest point of the upward motion is accompanied by *the* '*production*' *of an invisible activity* which '*generates*' the subsequent motion downwards. To conceive this '*latent*' *activity* '*gained*,' as an existence equal to the perceptible activity lost, *is not easy* [I should think it was not!]; but we may help ourselves to conceive it by considering cases of another class.

"When one who pushes against a door that has stuck fast produces by great effort no motion, but eventually by a little greater effort bursts the door open, swinging it back against the wall and tumbling headlong into the room, he has evidence that a certain muscular strain which did not produce 'translation' of matter through space was yet equivalent to a certain amount of such translation. Again, when a railway-porter gradually stops a detached carriage by pulling at the buffer, he shows that (supposing friction, etc., absent) the slowly-diminished motion of the carriage over a certain space is the equivalent of the constant backward strain put upon the carriage while it is travelling through space. Carrying with us the conception thus reached, we will now consider a case which makes it more definite.

"When used as a plaything by boys, a ball fastened to the end of an india-rubber string yields a clear idea of the *correlation* between 'perceptible' activity and '*latent*' activity. If, retaining one end of the string, a boy throws the ball from him horizontally, its motion is resisted by the increasing strain on the string, and the string, stretched more and more as the ball recedes, presently brings it to rest. Where *now* exists the 'principle of activity' which the moving ball displayed? *It exists in the strained thread of the india-rubber. Under what form of 'changed molecular state it exists' we need not ask.* It suffices that the string is the seat of a tension *generated by the motion of the ball and equivalent to it.* When the ball has been arrested, the stretched string begins to 'generate' in it an opposite motion; and continues to accelerate that motion until the ball comes back to the point at which the stretching of the string commenced—a point at which, but for the loss by atmospheric resistance and molecular redistribution, its velocity would be equal to the original velocity. Here the truth that the 'principle of activity' alternating between visible and invisible modes does not cease to exist, is readily comprehensible; and it becomes easy to understand the corollary that at each point in the path of the ball the *quantity* of the 'perceptible' activity, *plus* the quantity which is 'latent' in the stretched string, yield a *constant sum.*

"Aided by this illustration we can, in a general way, conceive what happens between bodies connected with one another not by stretched string, but by a traction exercised through what seems empty space. It matters not to our general conception that the *intensity* of this traction *varies in a totally different manner;* decreasing as the square of the distance increases, but being practically constant for terrestrial distances. These differences being recognised, there is nevertheless to be recognised a truth common to both cases. The 'weight' of something held in the hand

shows that there exists between one body in space and another, a strain; this downward pull, *ascribed to 'gravity,'* affects the hand as it might be affected by a stretched elastic string. Hence, when a body projected upwards and gradually retarded by 'gravity' finally stops, we must regard the 'principle of activity' *manifested* during its upward motion, but *disappearing* at its turning-point, *as having become 'latent' in the strain between it and the earth* —a strain of which the quantity is to be conceived as the product of its intensity and the distance through which it acts. Carrying a step further, our illustration of the stretched string will elucidate this. To simulate the action of gravity at terrestrial distances, let us imagine that when the attached moving body has stretched the '*elastic*' string to its limit, say at the distance of ten feet, a second like string could instantly be tied to the end of the first and to the body, which, continuing its course, stretched this second string to an equal length, and so on with a succession of such strings, till the body was arrested. Then, manifestly, the quantity of the principle of activity which the moving body had displayed, but which has now become 'latent' in the series of stretched strings, is measured by the number of such strings similarly stretched—the number of feet through which this constant strain has been encountered, *and over which it still extends* [Mr. Spencer's italics]. Now though we cannot conceive the tractive force of gravity to be exercised in a like way—though the gravitative action, utterly unknown in Nature, is probably a *resultant* of actions pervading the ethereal medium—yet the above analogy suggests the belief that the 'principle of activity' in a moving body arrested by gravity *has not ceased to exist*, but has *become* so much 'imperceptible' or 'latent' activity in the medium occupying space, and that when the body *falls* this is '*re-transformed*' into its equivalent of 'perceptible' activity. If we conceive this process at all, we must conceive it thus; otherwise, we have to conceive that a *power* is changed into a

space-relation [Mr. Spencer's italics], and this is inconceivable.

"Here, then, is the solution of the difficulty. The space-element of motion is not in itself a thing. Change of position is not an existence, but the manifestation of an existence. This existence may cease to display itself as '*translation*,' but it can do so only by displaying itself as '*strain*.' And this 'principle of activity,' now shown by translation, now by strain, and often by the two together, *is alone that which in 'motion'* we can call '*continuous*.'

"What is this 'principle of activity?' . . . Visible translation suggests by association the presence of a principle of activity which would be appreciable by our skin and muscles did we lay hold of the body. Evidently, then, this 'principle of activity' which 'motion' shows us is the objective correlate of our subjective sense of effort. By 'pushing' and 'pulling' we get feelings which, generalised and abstracted, yield our ideas of 'resistance' and 'tension.' Now displayed by *changing* '*position*,' and now by *unchanging* '*strain*,' this principle of activity is ultimately conceived by us under the single form of its equivalent muscular effort. So that the 'continuity' of 'motion,' as well as the 'indestructibility' of 'matter,' is really known to us in terms of 'force.'

"And now we reach the essential truth to be here especially noted. *All proofs of the 'continuity of motion' involve the postulate that the 'quantity of force is constant.'* Observe what results when we analyse the reasonings by which the continuity of motion, as here understood, is shown.

"A particular planet can be identified only by its constant power to affect our visual organs in a special way. Further, such planet has not been *seen* [Mr. Spencer's italics] to move by the astronomical observer, but its motion is *inferred* [Mr. Spencer's italics] from a comparison of its present position with the position it before occupied. If rigorously examined, this comparison proves to be a comparison between the

different impressions produced upon him by the different adjustments of his observing instruments. And, manifestly, the validity of all the inferences drawn from these likenesses and unlikenesses depends on the truth of the assumption that these masses of matter, celestial and terrestrial, will 'continue' to affect his senses in exactly the same ways under the same conditions; and that no changes in their powers of affecting him can have arisen without force having been 'expended' in working those changes. Going a step further back, it turns out that difference in the adjustment of his observing instrument, and by implication in the planet, is meaningless until shown to correspond with a certain calculated position which the planet must occupy, *supposing that no motion has been lost.* And if, finally, we examine the implied calculation, we find that it takes into account those accelerations and retardations which ellipticity of the orbit involves, as well as those variations of velocity caused by adjacent planets—we find, that is, that the motion is concluded to be 'indestructible' not from the uniform velocity of the planet, but from *the constant quantity of motion exhibited* when allowance is made for the motion communicated to, or received from, other celestial bodies. And when we ask how this communicated motion is estimated, we discover that the estimate is based on certain laws of force; *which laws, one and all, embody the postulate that force cannot be destroyed.* Without the axiom that action and reaction are equal and opposite, *astronomy* could not make its exact predictions.

"Similarly with the *à priori* conclusion that motion is continuous. That which defies suppression in thought is really the force which the motion indicates. But to imagine this, is not possible without imagining abstraction of the force implied by the motion. We are obliged to conceive this force as impressed in the shape of reaction on the bodies that cause the arrest. And the motion communicated to them, we are compelled to regard not as directly communicated, but as a product of the communicated force. We can

mentally diminish the velocity or 'space-element' of motion by diffusing the momentum or force-element over a larger mass of matter; but the 'quantity' of this force-element which we regard as the cause of the motion is unchangeable in thought."

In order to have every possible facility for examining the important statements made above by Mr. Spencer, I have, with one or two unimportant omissions, quoted the whole of the chapter on "The Continuity of Motion." This title, however, does not, I think, really express its scope and purpose; which I take to be the presentation of Mr. Spencer's argument affirming the "*indestructibility*" or "*persistence*" *of* "*force*," and as such I propose to consider it.

"*Gravity*" being a "*persistent*" and "*continuous*" "power," and "gravity" being such an important factor in celestial motions, we can, at any rate for the present, grant Mr. Spencer what he advances so far as they relate simply to the "*motions*" of "*celestial*" bodies. But some of his other statements we must carefully examine.

I think, as I have previously stated, that the modes in which forces express themselves may be described as causing *either states of motion*, or *states of pressure*.

I do not mean that either the pressures or the motions can always be "perceived," but that whether perceptible or not, all forces are at all times expressing themselves in these two ways, which may be further described as "pushing," or as "pulling." If we cannot, either by observation or by legitimate inference, recognise the presence either of "pressure," or "motion," of "pushing" or "pulling," how are we to believe in the *presence* of force? At the same time the incomprehensibility of a "state"—the incomprehensibility of the "how" of an action—is no bar to a belief in its existence, but if a statement be unsupported by what we think to be valid and sufficient evidence, or if the statement we are expected to believe involves in itself some irreconcilable

"*contradiction*," then, I think, we are bound to be not credulous, but critical.

At page 19, Mr. Spencer says, "To ask the question which more immediately concerns us—whether science is substantially true? is much like asking whether the sun gives light." "*Substantially* true"—yes. But it sometimes happens when an unscientific person advances as an argument in support of something he is discussing, some scientific statement with which he has come to be acquainted, it not unfrequently happens that some "scientist" who happens to be present will explode his argument, and knock him, intellectually speaking, into very small potatoes, by saying, "Ah, yes—yes; that *used to be* the general belief, but So-and-so's investigations and discoveries—which will render his name for ever illustrious—have demonstrated the entirely erroneous nature of the so-called facts to which you allude. The universal opinion—opinion of all persons competent to judge, that is—is so and so," and you hide your diminished head. But at the same time you cannot help thinking within yourself, "And is it not at least possible that, as the previous opinion of 'all persons competent to judge' turned out once to be a mistake, is it not 'possible' that the same thing may happen again? *Is not the history of science a history of corrected errors?*"

But let us return to Mr. Spencer, and examine the illustrations he gives us of "continuity of motion," or rather, of the "persistence or indestructibility of force"—examine, with all the care due to what constitutes the very foundation of Mr. Spencer's science and philosophy. Mr. Spencer's final appeal is always to the "indestructibility of force." To say of any given statement that it is contrary to the doctrine of the "persistence of force," is, with Mr. Spencer, to say that such statement cannot possibly be true.

We will first take the illlustration of the chandelier or pendulum, for the two illustrations are one.

First of all let us get as clear an idea of the conditions of

the problem to be solved as possible. There is a suspended chandelier, and there is me. We will for the moment leave out atmospheric and frictional resistance. There are two forces—"gravity" and "me." There is the action of "gravity" upon the chandelier; there is the action of "me" upon the chandelier; there is the result of the mutual action of gravity and of me upon the chandelier. Mr. Spencer asserts that an account of our mutual action upon the chandelier affords a proof of the persistence of force; in other words, a proof of the indestructibilty of force.

Gravity is, and always will continue, and always has been acting upon the chandelier. But the action of "me" upon it is temporary—evanescent. We will suppose the chandelier to be attached to the ceiling by means of a hook in a ring. If I had my finger between the hook and the ring I should feel the action of gravity by the painful "pressure" of the hook upon my finger. But I release my finger and place myself in such a relation to the chandelier as to be able to give it a push. I do so, and get out of the way of its return. It flies from me and describes an upward curve, its velocity decreases as it rises. At last its motion in the upward direction terminates and a downward motion commences, and with continually accelerated velocity, until it reaches the point from which it started. It does not cease to move when it has returned to the point from which my push caused it to move; but having reached that point, its motion becomes an ascending motion, but with decreasing velocity, till its motion in that direction also terminates and it begins once more to move with continually-increasing velocity down to the point where I applied my force to it; from whence it again moves upward with decreasing velocity till it again returns downward, and so continues to oscillate; but every oscillation describes a continually-decreasing curve, till finally it stops at the point from which I pushed it.

What has caused these motions? Why were they such

motions as we have seen them to be? and why did they at last cease? What has "become" of these "motions?" Are they still existent? or have they ceased to exist? But motion being not a thing, but a "state," the last questions are unintelligible. We will put them properly and then proceed.

What has "become" of the *force* of which these motions were the "effect?"

Gravity was acting upon the chandelier in the shape of "*pressure*" *before I touched it.* I had to push it—that is, I had to "communicate" force to it—in order to overcome the force-gravity. I did so. I pushed it, and the chandelier moved upwards for a time, but with continuously-decreasing velocity, until at last it began to move in a direction opposite to that in which I caused it to move—began to move downwards. Why did it move so high as it did? Why not further? If I had communicated more force to it, it would have gone higher. If I had applied less, it would have gone less high. It is clear, then, that what it did, until it began, and with increasing velocity, to move downwards, was caused by "me." But why, with the amount of force I communicated to it, did it go just as high as it did go—no higher, no lower? What was it that "*determined*" the particular extent of its motion? It must have been that my force was opposed by some other forces. The only other forces to do so were gravity and the opposition of the air. But we will for the moment leave the opposition of the air out of the question. The extent of the motion caused by me was, then, "determined" by the opposing force of gravity. But having risen to the height to which I caused it to rise, *it begins to descend.* We have seen that when I pushed it, the rate of motion was greatest at its commencement, and that its velocity diminished till it terminated in that "*direction*"—that is to say, the motion never ceased, but but only changed its "direction." *What* caused the chandelier to begin to descend? and why did its velocity increase

till it reached the point when the direction of the motion again changed—changed from an increasingly rapid motion downwards to a diminishing motion upwards? And why did the extent of the motion from point to point become at each oscillation less and less, until it finally ceased, and left the chandelier precisely *where* and as it was before I pushed it. How were all these phenomena caused? or rather, "*what*" caused them?

There was, first, the "rise" of the chandelier; which is at once accounted for by the force I applied to it.

But what caused the *first descent* of the chandelier? and what caused its "*second*" *ascent*, and its alternate descents and ascents, till it finally ceased either to ascend or descend, returning to a state of rest?

What is Mr. Spencer's answer to these questions? Mr. Spencer says (page 183):—

"But if what we may call the 'translation-element' in motion is *not* continuous, what *is* continuous? . . . Though at the end of each swing the translation through space ceases, yet there is '*something*' *which does not cease;* for the translation *recommences* in the opposite direction.. And on remembering that when a violent push was given to the chandelier it described a larger arc, and was a longer time before the resistance of the air destroyed its oscillations, we are shown that *what continues to exist during these oscillations is some 'correlative' of the 'muscular effort' which put the chandelier in motion.* . . .

"Still there remains a difficulty. If that element in the chandelier's motion, of which 'alone' we can allege 'continuity,' is the 'correlative' of the muscular effort which moved the chandelier, *what 'becomes' of this element at either extreme of the oscillation?* Arrest the chandelier in the 'middle' of its swing, and it gives a blow to the hand—exhibits some principle of activity, such as muscular effort can give. *But touch it at either 'turning'-point, and it displays 'no' such principle of activity.* . . . How, then,

can it be alleged that though the motion through space is *not* continuous, the principle of activity 'implied' by the motion *is* 'continuous?'"

"Unquestionably the facts show that the principle of activity continues to exist under *some* form. When not 'perceptible' it must be 'latent.' *How is it 'latent?'* A clue to the answer is gained on observing that though the chandelier when seized at the 'turning-point' of its swing gives no impact in the direction of its 'late' movement, it forthwith begins to pull in the *opposite* direction; and on observing, further, its pull is great when the swing has been made extensive by a violent push. Hence the loss of 'visible' activity at the highest point of the upward motion *is accompanied by the 'production'* of an 'invisible' activity which *'generates'* the subsequent motion downwards. To 'conceive' this 'latent' activity 'gained' as an existence *equal* to the 'perceptible' activity 'lost,' *is not 'easy.'* But we may help ourselves so to conceive it by considering cases of another class."

To the question—"What caused the first descent of the chandelier? Mr. Spencer replies, "That though the translation through space [the motion, that is,] ceases, there is 'something' which does not cease, for the translation commences in an opposite direction." He then asserts, "*That* what *continues* to exist during these oscillations is *some 'correlative' of the 'muscular effort' which put the chandelier in motion.* But if such *be* the case, what becomes of this element [of motion] at either 'extreme' of the oscillation? Touch it at either turning-point and it displays *no* such 'principle of activity." This has 'disappeared.' . . . How, then, can it be alleged . . . that the 'principle of activity' . . . is 'continuous?'

"Unquestionally the facts show that the principle of activity continues to exist under *some* form. When not 'perceptible' it must be 'latent.' Hence the *loss* of *visible* activity at the highest point of the upward motion, is

accompanied by the '*production*' of an *invisible* activity which '*generates*' the subsequent motion downwards. To 'conceive' this *latent* activity gained as an existence equal to the perceptible activity *lost, is not easy.*"

It would certainly seem so, from Mr. Spencer's point of view. Mr. Spencer's assertion is, that the cause of the first downward motion is the "same" as that of the first upward motion—namely, the "muscular force" I applied to the chandelier. That muscular force, or some "correlative" of it, has "become" "latent" in the chandelier, and which, "at the highest point of the upward motion, is 'accompanied' by the '*production*' of an invisible activity—which can only mean force—an activity which '*generates*' the subsequent motion downwards." An explanation which is to me wholly unintelligible. One can imagine force "transferred" to something else, but in the case of the chandelier there is "no" transference. If it *is* latent in it, why, if it becomes active?—but why *does* it become active—why does it not continue to move the chandelier in the same direction—that is, upwards? and why should it not continue to move it for ever in the same direction? Like St. Denis walking after his head was cut off, it is only the *first step* that costs. Force, according to Mr. Spencer, is "persistent," "indestructible." All the conditions are unchanged, *why should the motion be changed?* Also, why should the rate of velocity be reversed? While the chandelier was rising, its velocity gradually diminished; but now that it is decending, its velocity gradually increases. Mr. Spencer's explanation of the phenomena, cannot be considered an explanation at all. He says the force I expended "became" "latent," and, from some wholly inexplicable cause, became, at the point where the chandelier became (as he affirms) for a moment "motionless"—it "became" "active," and brought the chandelier down. Very well, granting that the "latent" force having become "active" *did* bring down the chandelier, what force was it that again raised the chandelier?

Had the "correlative" of my "muscular force" *again* become "latent," and *again* raised the chandelier, and so continued to cause the chandelier to oscillate till friction, caused by gravity and the atmospheric resistance, stopped it? Ah, "gravity!" Gravity, then, has been acting upon the chandelier all this time—a fact which seems quite to have escaped the notice of Mr. Spencer, at least he never alludes to it. He seems quite to have forgotten that there *is one* power or force which is in truth "*continuous*" and "*persistent*"—namely,—gravity. When I applied my muscular force to the chandelier and caused it to ascend, I was aware of an *opposing* force, which was gravity. I knew that the further I wished the chandelier to rise, the harder I must push it. *The quantity of gravity I overcame would determine the height attained.* If I gave it a little push, it would rise only a little. If I gave it a great push, it would rise higher; in fact, *the elevation attained would be in proportion to the amount of gravific force overcome by the muscular force expended.* I give it a good push. It begins to rise rapidly, but I observe that its velocity diminishes, and at last it seems to stop—for the sake of the convenience of argument, we will suppose it *does* stop. We will also suppose, for the sake of the argument, that I am able *to suspend gravific action* at the turning-point of the oscillation; which I do, and of course the chandelier, I naturally expect, will continue to rise. But no! To my astonishment the chandelier "comes down" as naturally as possible. You see the force which I communicated to it while gravity was opposing my force, and which while it lasted, overcame gravity and raised the chandelier to the height we saw, has, according to Mr. Spencer, not been destroyed, but has somehow become "latent" in the chandelier, and somehow—but for what reason I cannot imagine—changed its mind about its direction, and instead of continuing to *raise* the chandelier, has brought it *down*; and again "changing its mind" as to its direction, has "raised" it again; and so continues up and down, backwards and

forwards, till my muscular force, which has done all this wonderful amount of work, has foolishly allowed itself to become active—and also latent—in the atmosphere, and also in the hook and ring, in the shape of pressure; and how it conducts itself afterwards, heaven only knows; and I allow gravity to have its way again, and things resume their usual state. And besides all this, if my force in *opposition* to the force of gravity lifted the chandelier to the height it attained, then, *with* gravity it ought to bring down the chandelier at least *twice as fast as it moved upwards.*

Let us try to account for the phenomena in some other way. Mr. Spencer supposes force to be persistent, and, of course, indestructible. Let us now, on the other hand, suppose the opposite: that force is destructible, and, of course, not persistent.

Let us suppose myself and another person, whose strength is exactly equal to mine, to be opposed. Each wishes to push away the other. We both try our hardest, but being of exactly equal strength, and each exerting the whole of his strength, the result is that neither of us moves. There is no "motion;" there is only "pressure." Suppose we have been so doing for five minutes. Is the force I am now exerting, and by means of which I neutralise the force of my opponent, the *same force* that I exerted at the *commencement* of the first minute? I feel and know that if I relaxed my effort for a moment I should be toppled over. But I feel my strength is fast being exhausted—that I have not much *more* left. My opponent has, of course, the same feelings as I have.

What has *become* of the force each of us has expended? To account for a certain portion of it is not difficult. Though my body as a whole has not moved, yet some of its molecules, its substance—in the form of muscles, nerves, digestive apparatus, etc.—have in various ways been affected, and so accounts for a certain portion of my force. But the largest portion has been expended in neutralising the force

of my opponent, and a like amount of my opponent's force has been expended in—shall I again say—in "neutralising" mine. I will not say so, I will say that instead of mutually "neutralising" a certain amount of each other's, we have mutually *destroyed* a certain amount of each other's force. If we have not, what has become of it? My force has certainly not become "latent" in my opponent, nor has his force become "latent" in me. It has not become changed into motion of some other bodies, nor into heat, nor chemic affinity, nor anything else—I allowed for the respective portions which might be so transformed—it has simply been destroyed.

Let us apply similar reasoning to the phenomena presented by the chandelier.

We must bear in mind that motion is not a "thing," but a "state;" not an "existence," but the "sign" of an "existence;" and that the "existence" of which it is a "sign" or effect, is force—communicated or inherent, exhaustible or inexhaustible, destructible or indestructible, conditioned or unconditioned.

The force we call "muscular" force is conditioned, temporary, evanescent, destructible. But the force we call "gravific" force is unconditioned—except by density and mass—inexhaustible in quantity, but destructible. Because the supply is *inexhaustible* we are apt to think it *indestructible;* but it is, in truth, like a stream whose flow is continuous, but the flow of its water is never for an instant the *same* water: the *same* gravific force can never act twice. *Work done means the destruction of such an amount of force as is equal to the "work done."* Gravity is continually acting and produces motion or pressure, and is in so doing continually being destroyed.

In the motion of the chandelier my *exhaustible, destructible, muscular force* is opposed to *inexhaustible*, but *destructible*, force of gravity. Let us observe what happens when the *locale* of the contest is Mr. Spencer's chandelier.

There is the chandelier. The continuous, inexhaustible, streaming force of gravity is expending itself, destroying itself in the shape of "*pressure*" of the hook on its ring. As I destroyed my muscular force against that of my opponent, the streaming, continuous force of gravity is destroying itself in pulling against the cohesive forces of the molecules of the chandelier. The cohesive power of the molecules being the strongest, the chandelier remains, in every portion of its structure, unfractured. I push the chandelier. I communicate to it a certain amount of my muscular force, and I am "minus" that amount. At first, my force being *much greater* than that of gravity, it moves away horizontally and vertically. Its motion at starting is at its maximum, and is continuously opposed by the *unceasing, inexhaustible*, but *destructible*, force of gravity. Gravity and *my* force—the forces acting on the chandelier—*mutually destroy* "*equal quantities*" *of each other*. But the force of gravity is "inexhaustible," while the force which I communicated to the chandelier is a "limited" quantity. The consequence is, that momently it decreases—is destroyed by the opposing force of gravity, while momently *it* destroys an equal amount of gravific force. By this "mutual destruction" the force of the chandelier is gradually destroyed, and its rate of velocity gradually diminished; while, on the other hand, though the force of gravity is destroyed at an equal rate it makes no matter to gravity, *for as quickly as it is destroyed it is supplied by the continuous stream* of gravific force. At last there comes a moment when the last quantity of force possessed by the chandelier is opposed to an equal amount of gravific force. The two amounts mutually destroy each other. The "chandelier" has *no more* force. But "gravity" is as powerful as before. Its force is exactly the same as it was at the moment when the conflict commenced and the moment the last force of the chandelier is destroyed, the "stream" of gravity, no longer opposed, has its way, and begins to pull the chandelier downwards. Its momentum

and velocity increases as the square of the distance, and as it descends, it, in its turn, communicates to the descending body a force so great that on coming to the lowest point, instead of stopping, the chandelier begins to ascend, expending in opposing gravity *the force gravity has communicated to it*, ascends in the same way and under the same conditions as when it began to expend the force communicated to it by myself, and with similar results.

Let us now see how it is that after a time the motion of the chandelier ceases. The gravific "pressural" action of the hook upon the ring causes friction, the consequence of which has been that a portion of the force, acting in and on this chandelier while ascending and descending, has been destroyed. Another portion has at the same time been transformed into heat. At the same time another portion has been destroyed in opposing the atmosphere through which it has been moving. If there were *no "atmosphere"* and *no "friction,"* the motion would go on for ever, *for there would be no opposing force*,—there would be nothing to "destroy" or to "transform" the "force" which caused the motion. The reason that "celestial" motions are "continuous" is, that the space in which they travel *offering no resistance*, there is nothing to "destroy" the force which is the cause of their motion.

I think it is sufficiently clear that all the motions of the chandelier, *except* that *"first" elevatory motion caused by my muscular force, were wholly due to "gravity;"* and that the muscular force, and a quantity of gravific force to which it was equal, mutually "destroyed" each other during the act of the *first ascent* of the chandelier, and that my "muscular force" never became "latent" in the chandelier; the first descent, and all succeeding ascents and descents, being caused by gravity.

I will take another case from Professor P. G. Tait's work on "Heat," page 34 (the quotations in italics are throughout Professor Tait's):—

"Take a piece of very cold ice. Though the assertion may appear a little startling at first, it is really a stone, just as "much" as a lump of rock-salt or galena, only that its molecular or crystalline structure is somewhat more complex. It becomes warmer, just as other stones, by every fresh application of heat, *up to a certain point*, which we call its *melting-point—but you cannot make it any hotter*. Heat, now, does not change its temperature, but changes its molecular state. Precisely the same is true of the rock-salt, only that the temperature of its melting-point is considerably higher than that of ice.

"Suppose sufficient heat to have been applied just to melt all the ice. It is still the same substance from the chemical point of view; its temperature is still that of the melting-point, but it is a liquid instead of a solid. Apply more heat to the water. *Its effect is now to make the water warmer:* in scientific language, the temperature of the water rises. Every fresh application of heat raises the temperature more and more till it reaches what is called the *boiling-point*, but here the rise of temperature *again stops*. Further application of heat produces a new alteration in the molecular state, and the liquid changes into steam or water vapour.

"Suppose heat to have been applied till the whole of the liquid has *without further rise of temperature* been converted into vapour—*saturated steam*, as it is technically called—we can now, by applying more heat, raise the temperature of the steam, so that it becomes what is called *superheated steam*, and is practically a gas. But this gas cannot be heated indefinitely further without the production of *another molecular change*—this time what is commonly called a chemical change—*dissociation;* analysis or separation of the water-gas into its constituents, oxygen and hydrogen.

"Experiment has not yet told us whether or not still further application of heat may be capable of altering the physical or chemical nature of either of these now merely *mixed* gases."

Here two things are to be noted. At one time the application produces a rise of temperature; at another, it does not, but produces a change of molecular state. How are we to explain this difference? I suppose it will be said that when heat is continuously applied without producing any rise of temperature, the heat becomes "latent," just as Mr. Spencer said the "muscular force" applied to the chandelier became "latent." I think, that as in the case of the chandelier, the "muscular force" did not become "latent," so the "heat force" did not become "latent," but was *destroyed* in *destroying an equal amount of cohesive force* of the molecules of "*ice*." As long as there were any molecules unseparated, the heat destroyed itself in destroying an equal amount of their cohesive force. When the ice became water, then the heat "accumulated;" in other words, the temperature continued to rise till the heat force was competent to overcome the cohesion of the molecules of the "water," and thereby to change the water into "*steam*." So long as any of the water-molecules remained unseparated, the heat force and the cohesive force struggle together, and in their struggles destroying equal amounts of each other, till finally the heat—*which is continually reinforced*, while the cohesion is *not reinforced*—conquers the cohesive force of the molecules of the water. It is to be noted that so long as the particles are within the limits of cohesive attraction, their action—like that of gravity—is "streaming" and continuous.

It is of course to be noted, that besides the amount of heat destroyed in destroying an equal quantity of cohesive force, there must be present a sufficient amount of heat to prevent the cohesive force of the molecules *restoring the state of ice*, or *water*, or *steam*, or *gas*, as the case may be. It is this quantity of heat which I suppose is referred to when the "latent heat" of ice, or water, or steam, or gas is spoken of. But such heat is not "latent," but "active." Withdraw the continuous amount of "active" heat, needed to

keep the gas, gas, the steam, steam, the water, water, the cohesive force of the molecules being then allowed to act, the gas will become steam, the steam, water, the water, ice. The heat parted with will be not latent, but active.

Let us take another illustration from gravity.

In each of the opposite pans of a pair of scales let there be a ten-pound weight. Let one of the scales be fastened to the ground by a cord, so that on the ten-pound weight being removed, the position of the scale shall remain as it was before the removal of the weight. I take one of the ten-pound weights and hold it exactly on a level with the scale from which I have removed it. I hold it for a minute, and then replace it on the scale. *If my muscular force has become "latent" in that weight, it ought to get heavier the longer I hold it.* It ought more and more to over-balance the other weight. Does it? The balance is as exact as before. If I hold it a week, will it become any heavier by the accession of the muscular force I have expended upon it? If my force had become "latent" in it, I think it certainly would. But none of my force *has* become latent in it. *My* force and the force of gravity conflicting *destroyed equal quantities of each other.*

The mistakes made about force seem to me to be very curious. At page 206, "First Principles," Mr. Spencer writes:—

"When we enquire under what forms previously existed the force which works out the geological changes classed as aqueous, the answer is less obvious. The effects of rain, of winds, of rivers, of waves, of marine currents, do not manifestly proceed from one general source. Analysis, nevertheless, proves to us that they have a common genesis. If we ask—Whence comes the power of the river-current, bearing sediment down to the sea? the reply is—The gravitation of water throughout the tract which this river drains. If we ask—How came the water to be dispersed over this tract? the reply is—It fell in the shape of rain. If we

ask—How came the rain to be in that position whence it fell? the reply is—The vapour from which it was condensed was drifted there by the winds. If we ask—How came this vapour to be at that elevation? the reply is—*It was raised by evaporation.* And if we ask—What force thus 'raised' it? the reply is—*The sun's heat.* Just that amount of gravitative force which *the sun's heat overcame in 'raising' the atoms of water, 'is given out' again in the "fall"* of these atoms to the same level. Hence the denudations effected by rain and rivers, during the descent of this condensed vapour to the level of the sea, are *indirectly due to the sun's heat.* Similarly with the winds that transport the vapours hither and thither. Consequent as atmospheric currents are on differences of temperature (either general, as between the equatorial and polar regions, or special, as between tracts of the earth's surface of unlike physical characters), all such currents are due to that source from which the varying quantities of heat proceed. And if the winds thus originate, so, too, do the waves raised by them on the sea's surface. Whence it follows that whatever changes waves produce—the wearing away of shores, the breaking down of rocks into shingle, sand, and mud—are also traceable to the solar rays as their primary cause. The same may be said of ocean currents. Generated as the larger ones are by the excess of heat, which the ocean in tropical climates continually acquires from the sun; and generated as the smaller ones are by minor local differences in the quantities of solar heat absorbed; it follows that the distribution of sediment and other geological processes which these marine currents effect, are affiliable upon the force which the sun radiates. The only aqueous agency otherwise originating is that of the tides—an agency which, equally with the others, is traceable to unexpended astronomical motion. But making allowance for the changes which this works, we reach the conclusion that the slow wearing-down of continents, and gradual filling up of seas by rain, rivers, winds,

waves, and ocean currents, *are the indirect effects of solar heat.*"

Having enquired—"Whence came the water current of the river—the falling rain which formed it—the condensed, wind-driven vapour of which the rain was formed?" Mr. Spencer finally asks—"How came this vapour to be at that elevation?" and replies—"It was raised by evaporation. What force thus raised it? the reply is—The sun's heat. *Just that amount of gravitative force which the 'sun's heat overcame' on raising the atoms of water, is 'given out again' in the 'fall' of these atoms to the same level.* Hence . . . . we reach the conclusion that the slow wearing-down of continents, and gradual filling up of seas, by rain, rivers, winds, waves, and ocean currents, are the indirect effects of solar heat."

We have here to do with two kinds of forces, gravity and heat.

What is the special function of gravity?

If we were to suppose gravity to be conscious and to act with purpose, we might say its great desire and object is, to bring all things together so as to form a single body. Gravity is the great "aggregator."

What is the special function of heat?

If we were to suppose heat to be conscious, and to act with purpose, we might say its great desire and object is to separate all things into their ultimate atoms. Heat is the great separator, the great divider—the opposite of gravity.

Heat and gravity are thus antagonists. Each strives to undo the work of the other. Gravity and heat are always opposed. They may be said to be an antithesis of forces whose battle-field is the whole universe. Other forces have their attractions and their repulsions; but they have their periods of repose. But the contest between gravity and heat—so long as heat exists—is without pause.

How does heat act? *Gravity acts by attraction. Heat, on the contrary, acts by repulsion.* It attacks everything,

without exception, and it is—within the limits of its existence—irresistible. Is there any body which is absolutely impervious to heat? Is there any body which it cannot penetrate? Are there any walls which can hold it in or keep it out? Its "activity" ends only with its existence. You may destroy it by opposing to it an equal amount of some other force, but an equal amount of some other force will at the same time be destroyed by it. They more than realise the story of the Kilkenny Cats. Heat may be destroyed. But to render it "passive"—that is, "latent"—*is an absolute impossibility.* What could we suppose heat to be doing when it is doing—nothing?—for "latency" means "passive" existence.

Bodies are said to "absorb" heat. If they do absorb it, it is in exactly the same way as I would "absorb" a knife that was run into me. Bodies do not "absorb" heat. It is heat that "*penetrates*"—forces its way into bodies. And to that "penetration" bodies offer greater or less resistance, according to their nature.

As near as I can think it, the action of heat is something like that of water in a hydraulic press, where a pressure exerted on any part of a liquid is transmitted undiminished to every part of the liquid, in all directions. In the case of the hydraulic press the source of pressure is a small forcing pump, which, of course, is worked from without. But in the case of existing heat we must suppose the force to be self-acting and to keep on working until it is destroyed; and in being destroyed, destroys an opposing quantity of force equal to itself. It takes the directions of least resistance. Hence arise all the phenomena of conductivity, and of always falling from a higher to a lower temperature; for if heat were to rise from a lower to a higher temperature (without the addition to it of more heat, which would make it be of a higher temperature), it would imply the overcoming of a stronger force by a weaker one, which is absurd.

Heat, then, acts radially and in all directions at the same time.

Bodies do not "radiate" heat, but heat radiates itself—that is, if heat be present in a body, and it is hotter outside the body than in the body, the heat will penetrate further and further *into* that body. But if it be cooler outside the body than within it, then the heat which, like all forces but that of life, takes the directions of least resistance, will leave the hotter for the cooler—that is, it will "radiate" *itself.*

While on the subject of heat, one naturally thinks of electricity. I do not know much about electricity, but I have—like most people—been much perplexed as to how heat changes into electricity. I wonder if it might take place in this way:—

We will suppose a "sphere" of heat force. It radiates oppositionally in all directions. Now suppose the radial lines which act in all directions from the centre of the sphere should, in place of remaining a *sphere* of "radiating" force, suddenly become a *rod* acting only in *one* direction, instead of an infinity of radial directions. However, that is a subject with which we are not at present concerned.

Before returning to Mr. Spencer it may not be amiss to describe what the word "absorption" means for me.

Heat "penetrates," makes its way into a body in "spite" of being resisted. If I put my lips to one end of a straw, while the other is immersed in a glass containing a "sherry cobler" and begun to "suck," then I "absorb" the liquid, it is drawn into my mouth by an act of *me.* If I sit, unsheltered, in the rays of the sun, I do not "absorb" the heat, but the heat "penetrates" me.

The reading of the passage by Mr. Spencer, which I have quoted, excites in me a feeling of great astonishment. Mr. Spencer says, *the "vapour was raised by evaporation,"* and *that the "force which raised it was the sun's heat."* It appears to

me that the sun's heat had no more to do with "raising" it than I had. A very small amount of heat will convert water into vapour (not steam), as any one may see when the sun shines upon water, or upon the surface of the earth after a summer shower,—by separating or splitting off some of the molecules of water from the body of water. We see the separated molecules in the form of vapour. We see that vapour rise. But all the sun has to do with the matter is said when we say *it has caused a portion of the water to pass into the state of vapour*. But the *rising* of the vapour is caused, not by the sun, but by *gravity*. If I push a stick down into a body of water, and then let go of the stick, what is it that causes the stick to rise? The *pressure*—caused by gravitation—of the surrounding atmosphere upon the surface of the water, and the action of gravity upon the water itself; and the stick being lighter than the water, is forced upwards. What causes smoke to ascend? Being lighter than the surrounding air the pressure of the surrounding air causes it to rise. What causes the vapour we have been considering to ascend? The same cause—gravity, for the vapour is lighter than the surrounding air. What causes the motion of the currents of air we call winds? Gravity acting upon different densities. The differences of density having been caused by differences of temperature, which have caused the distances between the particles of water to increase, and so become, practically, lighter, whereupon gravity by the greater pressure of the denser particles forces up those which are lighter. Similarly with ocean currents. What causes a balloon to rise? What causes a cork, placed at the bottom of a pail of water, to rise to the surface? The same cause which has operated all through the cases we have given—gravity acting on different densities. The same cause has produced similar effects. All that has been done by the solar heat has been to increase the distances between the molecules of the water, or the particles of air, whereby both have been rendered

"lighter." All the rest—*all the risings—all the fallings, have been effected by the action of gravity*—as any one may see by noticing clouds floating in the air. If the density of a cloud is small in proportion to the density of the surrounding air, it will "float" high. If it be great—as in a "heavy" rain-cloud—it will float low,—will sometimes not "float" at all, but "rest" on the tops of the hills. If a great body of fine mist, floating high up, should happen to come in contact with a cold wind, or stream of air, then, as heat takes the line of least resistance, the heat will pass into the colder stream of passing air; and the attractions of the molecules of the water,—no longer kept apart, no longer overcome by the separating force of the heat,—will come into play. Condensation will take place; drops, smaller or greater, in proportion to the amount of departed heat, will be formed, and so, becoming heavier, will fall to the earth in a gentle shower, or a tropical torrent, as the case may be. All that solar heat effects, is the separation, by the overcoming of the attractions of particles of air or of water to greater or less distances. All the other phenomena described by Mr. Spencer —all the liftings up and all the pullings down, all the consequent effects in the shape of "the slow wearing down of continents, and gradually filling up of seas, by rain, rivers, winds, waves and ocean streams," are the *direct* effects of the action of gravity. Mr. Spencer's assertions seem to me to be directly contradicted by the facts. The sun's heat never became "latent," but was "destroyed" in destroying an equal amount of attracting forces of the molecules of the water, or of further separating the gases of which the air is composed.

CHAPTER VII.

PERSISTENCE OF FORCE.

ACTUAL ENERGY; POTENTIAL ENERGY—THE NATURE OF ATOMS—DIFFERENCE OF "POWER" AND "FORCE"—ILLUSTRATIONS OF "LATENCY;" THE CLOSED DOOR; OBJECTIONS—THE RAILWAY PORTER; OBJECTIONS—THE INDIA-RUBBER STRING; OBJECTIONS—WHAT IS THE FORCE THAT PERSISTS?—REPLY: ABSOLUTE FORCE WITHOUT BEGINNING OR END; OBJECTIONS—SPECULATIONS ON POWERS AND FORCES—INCONSISTENT ASSERTIONS OF MR. SPENCER.

BEFORE resuming our consideration of the cases of motion cited by Mr. Spencer as being likely to help us to understand how the muscular force communicated to the chandelier was supposed to become "latent" during its ascent, and manifested itself as the "principle of activity" in its first descending "translation through space," it will be necessary to further consider Matter as a "manifestation of force."

Mr. Spencer commences his chapter on the "Persistence of Force" (page 190) thus:—

"In the foregoing two chapters, manifestations of force of two fundamentally different classes have been dealt with. The force by which matter demonstrates itself to us as *existing*, and the force by which it demonstrates itself to us as *acting*."

Page 191.—" . . . The forms of our experience oblige us to distinguish between two modes of force; the one *not* a worker of change, and the other a worker of change. The *first* of these, the space-occupying kind of force, *has no specific name.*

"For the *second* kind of force—distinguishable as that by which change is either being caused, or will be caused if

counterbalancing forces are overcome—the specific name now accepted is—'Energy.' That which in the last chapter was spoken of as 'perceptible activity' is called by physicists 'actual energy,' and that which was called 'latent activity' is called 'potential energy.' While including the mode of activity shown in molar motion, Energy includes also the several modes of activity into which molar motion is transformable—heat, light, etc. It is the common name for the power shown alike in the movements of masses and in the movements of molecules. To our perceptions this second kind of force differs from the first kind as being *not intrinsic, but extrinsic*. That is, 'perceptible activity' equals 'actual energy,' and is—'extrinsic;' 'latent activity' equals 'potential energy,' and is—'intrinsic.'

"In aggregated matter, as presented to sight and touch, this antithesis is, as above implied, much obscured. Especially in a compound substance, both the 'potential energy' 'locked up' in the chemically combined molecules, and the 'actual energy' made perceptible to us as heat, complicate the manifestations of 'intrinsic force' by the manifestations of 'extrinsic' force. But the antithesis here partially hidden, is clearly seen on reducing the data to their lowest terms—a unit of matter, or atom, and its motion. The force by which it *exists* is *passive but independent* [Mr. Spencer's italics]; while the force by which it *moves* is *active but dependent* [Mr. Spencer's italics] on its past and present relations to other atoms. These two cannot be identified in our thoughts. For as it is impossible to think of motion without something that moves, so it is impossible to think of energy without something possessing that energy.

"While recognising this fundamental distinction between that '*intrinsic*' force by which body manifests itself as 'occupying space,' and that '*extrinsic*' force distinguished as 'energy;' I here treat of them together *as being alike persistent*. And I thus treat of them together partly for the reason that, in our consciousness of them there is the same

essential element. The sense of effort is our subjective symbol for objective force in general, passive and active. Power of neutralising that which we know as our own muscular strain, is the ultimate element in our idea of body as distinguished from space; and any energy which we can give to body or receive from it, is thought of as equal to a certain amount of muscular strain. The two consciousnesses differ essentially in this, that the feeling of effort common to the two is in the last case joined with consciousness of change of position, but in the first case not."

When we considered Newton's opinion, and the opinion of Boscovich, respecting the nature of atoms, we saw that both were beset with difficulties so great as to preclude acceptance of either. I then expressed my own opinion that an atom was not a "centre of Force" without extension, but a "sphere" of "Force or power" having extension. I have since expressed a further opinion that Force is destructible; from which seems to follow the unavoidable inference that if Matter is merely a manifestation of Force, and Force is destructible, that Matter must also be destructible. Whereas we seem to have no reason whatever to suppose that matter ever *is* destroyed.

It is to be observed that the words I used were, "That an '*atom*' was a '*sphere*' of '*Force*' or '*Power.*'" Generally speaking, the two words are used interchangeably; but, in fact, they are entirely different. In the passages I have just quoted from Mr. Spencer, he notices "two fundamentally different classes" of manifestations of Force. The force by which matter demonstrates itself as "*existing*," and the force by which it demonstrated itself as "*acting;*" that is to say, *Body, or bodies*, and their *actions*. "The one (matter, or bodies, or body), not a worker of change; and the other a worker of change, actual or potential. The first of these—the space-occupying kind of force (matter, or bodies, or body)—has no specific name."

He then refers to the phraseology used by physicists, and

identifies what he has himself called "perceptible activity," with the physicists' "actual energy;" and "latent activity," with the physicists' "potential energy." "Perceptible activity," or "actual energy," he describes as "extrinsic;" "latent activity," or "potential energy," as "intrinsic." . . . "The force by which matter (or bodies) '*exists*' *is passive but independent* [Mr. Spencer's italics]; while the force by which it 'moves' is *active, but dependent* [Mr. Spencer's italics] on its past and present relations to other atoms." And he further says, "While recognising this fundamental distinction between that *intrinsic* force by which body manifests itself as occupying space, and that *extrinsic* force distinguished as energy; I here treat of them together *as being alike persistent.*"

"*As being alike persistent.*"—

In expressing my opinion above, as to the nature of an atom, I said that it was "a sphere of Force or power." Are these words synonymous, or are they different? and if different, what is the nature and extent of the difference?

I think the difference is about as great as it can be. The difference is—that force is *destructible*, but *Power*, or matter, or body is *not*. An atom is not, properly speaking, a sphere of *Force*, but a sphere—not of power—but of *powers*. The names of these powers—at least the principal ones—are "gravity," "chemical attractions and repulsions," "cohesity," "elasticity," "polaricity," and possibly "magneticity." The "Forces" are consequent upon the "actions" of these "powers." "Powers" are *original;* gravity, chemical affinites, cohesity, elasticity, polaricity are not *derived* from anything, but are *inherent, inexhaustible, indestructible*. But "Forces" are derived and destructible. An atom *cannot be deprived of any of these "powers,"* neither can any *addition* be made to them. *These powers* in fact *constitute* the atom. I define an atom to be a *group*—not of *Forces*—but *of Powers*. *"Forces"* are these "Powers" *in action*. Gravity, chemical attractions and repulsions, cohesity, elasticity,

and polarity together constitute the true "*Potential* energy." "*Actual* energy," or Force, is the result of their action. Forces, cannot be passive, cannot be "latent." Their existence is action: the cessation of their action means the cessation of their existence. Forces are "derived," not "original;" their coming into existence depends upon the Powers. Forces cannot be passive, but Powers can. The only Power we know which is continuously active is gravity. The others are intermittent in their action, and their commencing to act depends upon other powers and their produced forces; they do not start themselves, they require to be started. The produced, derived, destructible Forces are heat, light, electricity, magneticity (?), and the product of their combinations and interactions, and their varying intensities. These forces are never "latent" or "locked-up," or "set free" or "liberated," but *generated, produced*, by the action of powers; except as activities they are non-existent. Powers are potential—power-ential—and may be passive. When they act, Force is the evidence of their action. For "Powers," Mr. Spencer "has no name," only for "Force," which he affirms to be "persistent, indestructible," whereas the only thing we know of that *is* destructible is—*Force*. The true indestructibles—the true things that are continuous—the true things that "persist"—are the group of Powers which constitute the atom.

Since writing the above, I have read the "Life of Charles Darwin," by his son. To that intensely interesting biography Mr. Huxley has contributed a chapter. In that chapter the following occurs (page 201, vol. ii.):—

"A second very common objection to Mr. Darwin's view was, and is, that they abolish teleology, and eviscerate the argument from design."

Mr. Huxley then quotes the "postulate of evolution," as expressed by himself twenty years ago. He writes:—

"This proposition is, that the whole world, living and not living, is the result of the mutual interactions, according to

definite laws of the forces* possessed by the molecules of which the primitive nebulosity of the universe was composed."

That "note" I read with an immense thrill. Did that desire "to substitute for the word 'Forces' the word 'powers'" indicate that in relation to "Force" and "Power" the thoughts of so great a scientist as Mr. Huxley were working in some direction which might possibly be akin to my own? Rightly or wrongly, I could not help deriving much encouragement from it. I am perfectly aware of my own awful impudence in daring to make assertions respecting scientific and philosophic matters, so contrary to the opinions, so—I may say—universally held by science and philosophy. My only defence for so doing is, that whatever I assert—whether correct or not—seems to *myself* to be correct. Whether it is so or not, is quite another matter. In working out what is set forth in this book, my method has been something like the following:—

If, on considering any subject, objections to current theories respecting it have occurred to me, I have propounded to myself some idea which seemed to be more in keeping with the facts of the case. Then I have set myself to seek out and consider every objection to my own idea I could think of. I need not say how often I found those "objections" insuperable. Then I sought for some better solution. If I found a solution which no attack I could myself make upon it could shake, then, for *me*, that solution was considered to be correct, and as such it has been, or will be, set forth in this book. How many suppositions I have made about various things, and how many of them failed under the attacks I made upon them, would make a story in which the comic and the tragic elements would be found to be curiously mingled—but I am

* "Note [by Mr. Huxley].—I should now like to substitute the word powers for forces."

afraid the latter would greatly predominate—in my own estimation, that is; possibly a spectator might have been of opinion that the balance lay very much the other way; upon which my comment would probably be—that "what was sport to him was death to me." Mr. Huxley somewhere says, with pathetic truth—(I don't know whether I quote his words quite correctly, but the substance I do)—"The true tragedies of science are when some beautiful theory is slaughtered by some ugly little fact." You have worked out something which seems all right, and you contemplate your work as a mother contemplates her baby, and while you are doing so, the "ugly"—ugly—little fact looks up at you with a Mephistophelian grin, and runs a pin into your air-filled bladder, which immediately collapses, and like Lord Ullin, in the ballad, "you are left lamenting." Though with a mournful determination to try and "work it out somehow," you set to work to go on again and again, till you find out some theory which obstinately refuses to be "hoist" with any "petard" you can, yourself, bring to bear upon it, and you venture, in your secret soul, to hope criticism—if you should happen to have any—will be equally unsuccessful. But we must return to Mr. Spencer.

We will now proceed with the cases of motion cited by Mr. Spencer (page 184, "First Principles"), as being likely "to help us to understand" how the muscular force communicated to the chandelier became "latent" during its ascent, and manifested itself as the "principle of activity" in its first descending "translation through space," to conceive which, to use Mr. Spencer's own words, "is not easy." He says:—

"When one who pushes against a door that has stuck fast produces by great effort no motion, but eventually by a little greater effort bursts the door open, swinging it back against the wall, and tumbling headlong into the room, he has evidence that a certain muscular strain which did not

produce translation of matter through space, was yet equivalent to a certain amount of such translation."

Are we, then, to suppose that the force applied in the first instance to the door became "latent" in the door? If we are so to suppose, then, a *less*, and not a *greater*, fresh effort ought to have had the effect described, seeing it would be helped by the force of the first ineffectual push, now "latent" in the door. But the fact is, the resisting power of the door and the pushing force of the man mutually destroy each other, but the balance of force being in favour of the door, it did not move. In the second "greater push," the balance was the other way, and with the consequences described. 'But it cannot be said to help us to in any way conceive the principle "of activity" passing from an active to a latent state.

The next instance is:—

"When a railway-porter gradually stops a detached carriage by pulling at the buffer, he shows us that (supposing friction, etc., absent) the slowly-diminished motion of the carriage over a certain space, is the equivalent of the constant backward strain put upon the carriage while it is travelling through that space."

Well, but where is the passage from "activity" to "latency?" The muscular force of the porter, and the Force acting in the moving carriage being opposed have destroyed equal portions of carriage-Force and porter-force. The consequence is that in proportion to its loss of force the carriage moves more slowly. Mutual destruction of force by opposing forces has produced its invariable effect —diminution of motion.

Nevertheless, Mr. Spencer continues:—

"Carrying with us the conception thus reached, we will now consider a case which makes it more definite.

"When used as a plaything by boys, a ball fastened to the end of an india-rubber strings yields a clear idea of the 'correlation' between 'perceptible' activity and

'latent' activity. If, retaining one end of the string, a boy throws the ball from him horizontally, its motion is resisted by the increasing strain on the string; and the string, stretched more and more as the ball recedes, presently brings it to rest. *Where, now*, exists the 'principle of activity' which the moving ball displayed? It exists in the *strained thread* of the india-rubber. Under what form of *changed molecular state* it exists we need not ask. [It is the very thing we *must* ask.] It suffices that the string is the seat of a tension 'generated' by the motion of the ball, and equivalent to it. When the ball has been arrested, the stretched string begins to 'generate' in it an opposite motion; and continues to accelerate that motion until the ball comes back to the point at which the stretching of the string commenced—a point at which, but for loss by atmospheric resistance and molecular redistribution ["molecular state" again] its velocity would be equal to the original velocity. Here the truth that the 'principle of activity,' alternating between visible and invisible modes, does not cease to exist when the translation through space ceases to exist, is readily comprehensible: and it becomes easy to understand the corollary, that at each point in the path of the ball the quantity of its "perceptible" activity, *plus* [Mr. Spencer's italics] the quantity which is "latent' in the stretched string, yield a constant sum."

The ball having been thrown, and the india-rubber string thereby extended, Mr. Spencer asks—"Where, now, exists the 'principle of activity'—the force—which the moving ball displayed?" and replies—"It exists in the strained thread of the india-rubber." And adds—"*Under what form of changed molecular state we need not ask.* It suffices that the string is the seat of a tension generated by the motion of the ball, and equivalent to it."

It is surprising that Mr. Spencer should make such a statement. The tension present in the string is not the consequence of the force derived from the hand of the boy

who threw it having become "latent." That force was "destroyed" in overcoming the cohesion of the molecules of the string, which molecules possess the "*power*" called *elasticity*. The Force in the thrown ball, which stretched the string, did not "generate" the force now present, but was merely the occasion of the generation of Force by the elastic "*power*" possessed by the molecules of the india-rubber; and which, when the force communicated to the ball by the hand of the boy is entirely destroyed by the resistance to separation of the molecules of the india-rubber string, will bring it back again with a force equal to the force which called the "elastic power" into "action." I will quote the definition of "elasticity" given in "Ogilvie's Imperial Dictionary":—

"Elastic, elastical. Springing back; having the power of returning to the form from which it is bent, extended, pressed, or distorted; having the *inherent property* ["*Power*," that is] of *recovering* its former figure or volume after any external pressure, which has altered that figure or volume, is removed; rebounding; flying back."

"Limits of elasticity. The utmost limits to which elastic bodies can be compressed or extended, without destroying their elasticity."

I do not admit that the "*power*" elasticity *can* be destroyed. I suppose that when elasticity is said to be "destroyed," it simply indicates that the limits of that attraction called "elasticity" have, been overpassed, not that the power "elasticity" has been "destroyed." Bring the molecules back to *within* the "sphere of attraction" and they will behave as before.

The return of the ball by the contraction of the string—the molecules still being *within* the sphere of attraction—was due to its "elasticity," not to the force communicated by the boy having become "latent."

Let us suppose the string, instead of being india-rubber, to be a string of some non-elastic or very slightly elastic

substance—twine, for instance. Would the ball "return" to the hand of the thrower? If, as Mr. Spencer supposes, the force had become "latent" in the string, why should it not return? But it does not return.

I will put it another way. Let us suppose two upright bars to be each fixed in a vice, and suppose they both require an equal amount of force to bend them to an equal extent. One of them shall be steel, the other, lead. I bend the steel bar till it touches the ground. I release it. It flies to its former position, and beyond it. I bend the lead bar till *it* also touches the ground, and release it—but there it remains. If my force, become "latent," caused the return of the steel bar, why did it not also cause the return of the lead bar? It did not do so, because the force I applied to it had *not* become "latent;" because in overcoming and destroying a certain amount of the cohesive attractions of the molecules of the lead, my force destroyed itself: but it did not destroy the "inherent" elastic "*power*" of the molecules of the steel, for being a "Power," it is indestructible: but it destroyed an equal amount of the "Force," which was called into action by itself; and when my force ceased to overbalance the elastic power of the steel, then the bar returned. The bar of lead did not return, because it was destitute of elastic power, and the force which resisted flexure having, instead of becoming "latent," been destroyed could not, of course, bring it back.

It is strange that in the case of the chandelier, Mr. Spencer should have ignored "gravity." It is strange that in the case of the india-rubber string, he should also have ignored "elasticity."

I do not think any of the cases adduced by Mr. Spencer have in any way "helped us to conceive" this "latent" activity "gained" as an existence equal to the "perceptible" activity "lost." Nevertheless, Mr. Spencer assumes that his reasoning has been satisfactory, and that its result must be, "that whoever contemplates the relation in which it stands

to the truths of science in general, will see that this truth transcending demonstration is the 'Persistence of Force.'" I certainly agree with Mr. Spencer, that in the cases adduced by him the Persistence of Force has indeed "transcended demonstration."

"But now," asks Mr. Spencer, "*What is the force of which we predicate persistence?* It is not the force we are immediately conscious of in our own muscular efforts; for this does *not* 'persist.' As soon as an outstretched limb is relaxed, the sense of tension disappears. True, we assert . . . that the force which has ceased to be present in our consciousness *exists elsewhere.*" Mr. Spencer then refers to the lifting of a chair (page 58, "First Principles," which I have already considered), where he affirms that the force acting as the weight of the chair and the force acting in *us* cannot be "like each other." "It suffices to remark," he says, "that since the force as known to us is an affection of consciousness, we cannot conceive the force existing in the chair under the same form without endowing the chair with consciousness." I have shown that the difference consists not in the forces, but in that the chair-force is Force *alone*. The man-force is Force *plus consciousness;* but Mr. Spencer says (page 192D), "Yet since their likeness in kind would imply in the object a sensation of muscular tension, which cannot be ascribed to it, we are compelled to admit that force as it exists out of our consciousness is not force as we know it. Hence [and here Mr. Spencer states his doctrine], hence the Force of which we assert "persistence" is *that Absolute Force* of which we are indefinitely conscious as the necessary correlative of the force we know. By the Persistence of Force, we really mean the persistence of some Cause which transcends our Knowledge and Conception. In asserting it *we assert an unconditioned Reality, without beginning or end.* . . . The continued existence of an unknowable as the necessary correlative of the knowable.

"The sole truth which transcends experience, by under-

lying it, is thus the Persistence of Force. This being the basis of experience, must be the basis of any scientific organisation of experiences. To this an ultimate analysis brings us down; and on this a rational synthesis must build up."

And yet, (at page 31, "First Principles)" Mr. Spencer asserts—the assertion which led to our study of "ultimate scientific ideas"—"That self-existence therefore necessarily means existence without a beginning; and to form a conception of 'self-existence' *is to form a conception of existence 'without a beginning.'* Now by no mental effort can we do this. To conceive existence through infinite past time, implies the conception of infinite past time, which is an '*impossibility.*'"

The relations of these two assertions to each other directly imply one of two things—Mr. Spencer has either performed two "impossibilities"—that is, he has conceived the "impossible" conception of conceiving "existence without a beginning;" and he has conceived the "impossible" conception of conceiving infinite past time;—or he has contradicted and stultified himself. Which is the right inference the reader must judge.

I have, I hope, shown that Mr. Spencer has entirely failed to prove that Force is "persistent," or motion "continuous." That Force cannot, being from its very nature "derivative," not original, be "continuous" or "persistent;" that in all the cases he has adduced in support of, his postulate, the phenomena have been shown to be inexplicable, on the supposition that Force is indestructible, but are explicable, on the supposition that Force *is* destructible and explicable in no other way. That only by resolutely ignoring the action of powers plainly present—as "gravity," in the case of the oscillating chandelier, and of "elasticity," in the case of the india-rubber string—has he been able to give even the faintest semblance of truth to the thesis he supports. Further, when Mr. Spencer alleges that the

Force of which we assert persistence is *an* "Absolute Force," he is as much in error as when he asserts that Force is "persistent." The elemental substances of which we have knowledge are not a single one, but are about seventy. By what warrant of reasoning can Mr. Spencer be justified in assigning for these seventy different kinds of effects only a single cause? At the same time I am not, myself, of opinion that because we know of seventy different kinds of effects there must necessarily be as many different kinds of causes. All the phenomena we experience which are alike must, I think, have like causes. Now gravity is the same power, no matter in which of the seventy elements it may exhibit itself. An atom of gold and an atom of tin fall at identical rates. The same may be said of cohesity and of elasticity—it may be also said of chemic attractions and of chemic repulsions, and of polarity (I make no assertions respecting magneticity). If what I have previously advanced be correct: if atoms are groups of powers, and if Forces are these powers "acting," may we not imagine that the seventy elements are what they are in consequence of various quantities and proportions and arrangements of the powers we call gravity, cohesity, polarity, elasticity, chemicity attractive and chemicity repulsive, and it may be, magneticity? *I should call these the true elements of what we call matter, matter being considered a "spiritual" substance composed of groups of powers.*

I have given the above as "Powers," because it seems to me that while heat and other forces which are the result of the actions of the powers are transformable into one another, gravity, polarity, elasticity, cohesity, chemic attractions, and chemic repulsions are unchangeable, and incapable of transformation into any of the other powers. May not what we call chemical union be a new arrangement, a new grouping, of the "powers" of which atoms consist? and are not these "powers" capable of "interpenetrating" each other so as to pervade each other?—we see that they do pervade, inter-

penetrate, each other; for do not gravity, chemic attractions, chemic repulsions, cohesity, *all exist at once through and through each atom? Does not space exist through and through each atom?* Does not heat exist through and through each atom? Does not electricity go through some bodies as if they were non-existent? Do not the groups of forces we call light go through and through each other, each as if the others were non-existent? Just for a moment let any one look about him. If he be in a confined space—a room, for instance—of how many perfectly defined colours may he be conscious? Hundreds. Let him look on a wild and woody landscape. Rocks, streams, trees, clouds, with all their myriad reflections come to his retina clear and unbroken. How many other rays of light has a given ray passed through without injuring or being injured? Everything seems "transparent" to some things, "opaque" to other things, while to gravity *all things* are transparent. Everything is pervaded by multitudinous other things, and space pervades all things. But if atoms be groups of different and intransformable "powers," what becomes of Mr. Spencer's "*Absolute Force.*" We see that Force is not persistent, but destructible, and Mr. Spencer's "Absolute Force" consists of at least six different "powers," and consequently cannot constitute, or be, an absolute.

In order to be able satisfactorily to continue our criticism of Mr. Spencer's opinions, it is now necessary to pass from the study of physics to the study of that which is beyond physics—to the study of metaphysics. Before doing so, however, it will be well to place before the reader those statements of Mr. Spencer which led us from the study of his assertions in relation to "self-existence" to the study of "ultimate scientific ideas." Mr. Spencer, in the following words, denied that it was possible to conceive self-existence. His denial was expressed as follows:—

"Self-existence, therefore, necessarily means existence

without a beginning; and to form a conception of self-existence *is to form a conception of existence without a beginning.* Now by no mental effort can we do this. To conceive existence through infinite past time implies the conception of infinite past time, which is *an impossibility.*"

To this, let us oppose the quotation I made from him at page 319.

"Hence the force of which we assert persistence, is that "*Absolute*" *Force* of which we are indefinitely conscious as the necessary correlate of the force we know. By the persistence of force we really mean the persistence of some cause which transcends our knowledge and conception. In asserting it, *we assert an unconditioned reality, without beginning and without end.*"

Mr. Spencer seems to be possessed of some kind of ability resembling that described in a certain hymn—the ability

> "That laughs at impossibilities,
> And cries, 'It *shall* be done.'"

For certainly the force of contradiction "can no further go."

CHAPTER VIII.

FROM PHYSICS TO METAPHYSICS.

THE PRESENT WRITER'S THOUGHTS ON THE SUBJECT—LIFE, SENSATION, MEMORY, IMAGINATION, THOUGHT, CONSCIOUSNESS—SENSATION THE CONSCIOUSNESS OF DIFFERENCE—CONSCIOUSNESS ONLY KNOWN BY BEING EXPERIENCED—SENSATION—THOUGHT, THE CONCEPTION OF OPPOSITES, OR AN ANTITHESIS—MEMORY, PHYSICAL AND MENTAL ASSOCIATION—IMAGINATION, A NEW COMBINING OF THINGS OR THOUGHTS.

Up to the present we have had, as the subject of our consideration, Mr. Spencer's opinions respecting ultimate scientific ideas, especially ultimate scientific ideas respecting Space, Time, Matter, Motion, Force—in fact, we have been endeavouring to ascertain, as well as we could, the ultimate phenomena of what is often generalised in the words "matter and motion;" and whether it was possible to form ideas of these phenomena which should be free from "contradictions," "irrationalities," and "alternative impossibilities."

The conclusions on these subjects at which we have arrived, are different from those of Mr. Spencer. Mr. Spencer says (page 68, "First Principles") "If, respecting the origin and nature of things, we make some assumption, we find that, through an inexorable logic, it inevitably commits us to 'alternate impossibilities' of thought." We did not find it so. We found that though a careful study of physical phenomena might lead us to *incomprehensibilities, to mysteries*, which, from their very nature, and from the nature and limited extent of the powers of the human creature, it was not

possible for us to understand; yet it did not, as Mr. Spencer contends, "commit us to alternative *impossibilities of thought*"—to "*contradictions*," in fact. We found, I think, that when such "alternative impossibilities of thought"—such "contradictions," presented themselves, they arose, not from any inherent necessity in things, and in thoughts about their nature, but from some error in the premises reasoned from, or from some inaccuracy in their statement, or some misconception of the facts to be considered, or some errors in the metaphysical principles which, even when statements were correct, vitiated the deductions made or the inferences drawn from them. It is these "metaphysical principles" of Mr. Spencer I now propose to examine. Until we have done so, we cannot resume our enquiry as to the validity of the judgments pronounced by Mr. Spencer respecting the "origin and nature of the universe," and other subjects arising out of them—such as the nature of the Absolute, the Infinite, the First Cause—whether or not they exist and are conceivable, or exist but are not conceivable, or do not exist at all; whether, *if* they exist, creation can be thinkable; whether, supposing there be the Absolute, Infinite, First Cause, the Finite can co-exist *with* it; or whether the Infinite is really not the Infinite, but only an "infinity" composed of unlimited numbers of "finities" and space. Will Mr. Spencer's ultimate affirmations on these subjects be found to be in harmony with, or be found as directly to contradict, his primal statements, as we have seen them to do in the chapter just concluded? Time will show.

As metaphysics can be only properly criticised metaphysically, I propose to set forth my own metaphysical opinions, whereby I hope the reader will be enabled more easily and correctly to judge statements made by Mr. Spencer, and other statements made by myself.

"Metaphysics" means after "physics." What is to be included in the term "after"-"physics?"

I think that under that term are to be included,—life—sensation—memory—imagination—and thought; and the understanding of the laws and modes of action and interaction of these phenomena.

And first—What is "sensation?" or rather, What is *a* "sensation?" *A sensation* is a state of an "I," or "*Ego*," and is to be defined as a *consciousness of difference.*

If it be asked—What is "consciousness?" I have no reply other than that being an ultimate it cannot be either defined or described, and can be known only by being experienced—the same as light can be known only by being experienced. It may be—in a way—defined by a negative, as being the "positive" of which the absence of consciousness, or *un*-consciousness, is the "negative."

I have already given my reasons for postulating an *Ego*, or I, of which a sensation is a state. Without an "I" there can be no consciousness—such as we know it.

But what is meant by a "consciousness of difference?"

I will endeavour to explain.

We are, roughly speaking, said to have five "senses"—that is, we are so constituted as to have five arrangements of certain parts of our bodies, so as to be capable of being affected in five different ways by certain somethings external to us, which we group together under the terms Bodies and their Forces. They are called respectively—touch—taste—smell—hearing—sight. Of these the earliest developed is "touch." Indeed it may be said that all our senses are but different affections produced in us by some kind of "touching."

We will suppose a creature of very low development—but distinctly capable of consciousness—to be somehow suspended in space, and so not "touched" by anything. We will suppose that though "capable of consciousness" it has never yet been "conscious."

I think universal experience warrants us in believing that unless some other body came in contact with—that is,

"touched"—that creature, it never would have become "conscious," for a thing cannot be conscious of itself except it become at the same time conscious of something which is not itself, but "different" from *it*, and from which *it* is of course "different."

While alone—while "un"-"touched," and so long as it remains untouched—consciousness cannot be produced in it. But let something "touch it." It will at once become conscious, not only of itself, but *also* of something which is not itself. It will have a "sensation." The sensation of self and not—self will be produced *at one and the same time*. The *elements* of that sensation, in this, its earliest form, are the "consciousness of difference" betwixt two things—itself and something else.

If we turn to the highest of Beings capable of consciousness to,—man, we find him endowed with four additional senses, by means of which he may have many sensations at the same time. But however numerous, and however delicate they may be, they are all to be defined as consciousness of "difference" between self and that which causes the sensations. The consciousness of difference between self and all that causes sensation, is a sensation that "accompanies" all "other" sensations whatever. And what is true of man is true also of all conscious creatures, down to the very lowest. All *other* sensations are always, *plus* the fundamental, the primordial sensation of difference between self and not—self, me and not—me, which is the *first* sensation experienced by all, and *accompanies all that follow it*. Therefore, of whatever *other* sensations we may speak, we shall always—seeing it needs no affirmation—take for granted the presence *along* with them, of the sensation, "me, and not—me."

It goes without saying that if we are to have another sensation "*plus*" *me and not—me* already given, there must be a new "difference" present.

We will take sight—the sense of sight—to help us. And

instead of "the lowest of developed creatures capable of being conscious," we will take the highest—Man.

Let us suppose a man to be absolutely and entirely blind, and to have been blind from his birth. Let him be any age you please—say fifty. He will thus have had fifty years' "experience" of "darkness." Would he be "conscious" of that "darkness;" not in the least. To produce "consciousness" there must be "difference," and in this "darkness" there has been no "difference," for it has always been the same. He could no more be conscious of darkness than the "lowest developed creature capable of being conscious" could be conscious, till it was "touched" by something "different from itself" could be "conscious." The "creature" not knowing, not—self, could not know self. The blind man not knowing light could not know darkness—although most people would be inclined to think that though he could not know *light*, never having experienced light, yet he certainly ought to know what *darkness* was, seeing he had had fifty years' "experience" of *it*. A moment's reflection, however, would show that he would not. But let the blind man suddenly be able to see. Then the hitherto *useless* fifty years' "inexperienceable" "experience" of darkness being "differenced" by the new experience light, he would at once have the "sensation"—the consciousness of "darkness" *and* "light," which would for him come into existence *simultaneously*, for there cannot be a difference unless there be two things; and *till he "experienced" light he did not "experience" darkness*. Although he had lived in darkness for fifty years, that darkness was for him—non-existent. For him the "light," and the "darkness," the "consciousness" of the "difference" between them were all three born together.

Suppose two persons having different powers of vision are after sunset gazing up at a cloudless sky while yet the still strong, though waning, light permits no star to be perceptible. The light dies away, and the gazer with the most

powerful vision exclaims—"There, look at that first star that has come out!" The other cannot for some time see it. That is, he is not conscious of any new difference present in the heavens, and the one has a "sensation" while the other has not. At last the star is seen by both, both have had caused in them that "consciousness of difference" which constitutes a "sensation."

A man coming out of the fresh air into a small room in which several men are smoking, exclaims, as he enters—"Pugh! how can you fellows breathe in such a horrid atmosphere?" While he retains the feeling of the fresh air without, as "different" from that atmospheric state within, he has a "sensation"—is conscious of a "difference." As the sense of the fresh air dies away, as the condition of "difference" ceases to exist, he becomes unconscious of that atmospheric state which, on entering, he called "horrid."

I am told to look at a slide about to be placed upon the "stage" of a microscope magnifying, say, 5,000 diameters. I do so. I can discern nothing but a drop of muddy-looking water. In looking, two effects—the one a sensation, the other a thought—are caused in me: that "sensation" which I call a drop of water; and that "thought" about the water which I call "muddiness." The drop of muddy water is placed upon the stage of the microscope, and I look at it through the microscope. In place of the one sensation named I now have hundreds. The drop is alive with *animalculæ*, swimming about in all directions, some of them so small that millions of them might be packed together within the limits of a cubic inch. The number of "differences" has been indefinitely increased.

I have already spoken of the immense number of sensations we may have at the same time—vision, hearing, smell, touch, taste, all being in action simultaneously.

But every sensation does not cause us to be "conscious" of it. I may be so absorbed in thinking, or with other

sensations, that I am scarcely conscious of any of the new sensations present in me. When I am "*conscious*" of a difference, or sensation, its name is changed; it is a "*perception*" *of a* "*sensation*"—briefly called a perception. Confusion frequently arises from treating unperceived sensations as if they were perceived; as if to have a sensation and to perceive or be conscious of that sensation were the same thing. Strictly speaking, a sensation is nothing more than an affection of a sense-organ, and does not necessarily produce consciousness.

It may not be amiss to repeat what I have elsewhere mentioned—that sensations, whether perceived or not, are the result of some action upon us from without. *That in sensation, the Ego, or I, is wholly* "*passive*," has no share in the "production" of the sensation. *The* "*I*" *does not* "*act*," *but is acted* "*upon*." When I see, hear, etc., I have no share in the production of these phenomena. All animals, man included, are "sensed" in the same way. What differences of intensity or delicacy there may be in the sensations produced, depend upon some difference in the powers of the senses of the animal which is acted upon. Seeing, hearing, are the same in all creatures, and differ not in kind but in degree. Some creatures see, hear better than others, but all see alike, all hear alike, and all are alike "passive." When I "*look*" at something, or "*listen*" to some sound, it simply means that I endeavour so to arrange my organ as to be in the most favourable relations for seeing or hearing, etc., so as to be able to perceive as many, and as great, and as small differences as possible.

Sensation, then, is the consequence of the action upon an "I," or *Ego*, of causes external to it.

The "I" is passive during such action.

That we may have sensations, or be "sensed," without being "conscious" of them.

When we are conscious of a sensation, we call it a "perception."

That "consciousness" is not a *thing*, but a *state* of an "I," or *Ego*.

That we cannot speak of "states of consciousness" as being affected by anything, but only as being affections of some *Ego*, or I. It is not "consciousness" that is "conscious," but an *Ego*, or "I." And sensation, using the word as synonymous with perception, is the consciousness of difference.

And next—What is Thought?

"Thought," is an abstract name for a something which is "different" from "sensation." In order to properly understand what it means, we must alter the question; we must ask—What is *a* Thought?

We have seen that a "perceived" sensation is a consciousness of some kind of difference. It is produced or caused by the action of external things upon a creature capable of consciousness—the "creature" being "passive" during the said action. But in "thinking," we are conscious that we are not being "acted upon," but are ourselves acting; that we are "doing" something, not merely having something done *to* us, that we are not *passive* but *active*. What we have to discover is—what is the nature of the "act," and how it is performed?

I have defined a "sensation" to be a consciousness of difference. How are we to define a "Thought?"

I define a Thought to be a "conception of opposition," or "opposites." Such conception being an act of an "I."

A Thought is the conception of opposites—of an antithesis. It is a unity composed of a duality. It does not exist in Nature as a thing, but is an operation—an act of the mind. It is not possible to have half a thought, for we cannot think of half an opposition any more than we can think of half a difference. Opposition, like "difference," is not conceivable except as involving "Two." If there were only one thing in existence, there could be no sensation, for there could be no difference, and there could be no thought, for there could

be no opposition; and at once all the metaphysical difficulties about the Absolute—the Infinite—the First Cause—make their appearance. If the Absolute be one and simple, how can there be either Difference or Opposition? With only a single experience, sensation and thought are alike impossible.

Let us suppose ourselves, with perfectly developed powers of thinking, but wholly without experience, to be placed in space. Directly in front of us we see two bodies, separated by a distance of, say, two feet. If we, with our present experience, were so placed we would at once know that the two bodies were "separate;" but if we were, as supposed, "without experience," would the sight of the two bodies give rise in us to the conception that they were "separate?" Of course it would not, indeed could not, for "separate" is the "opposite" of "together," and we could not think—conceive—separateness without an experience of its opposite, of togetherness: one thing cannot constitute an opposition, and because in the case supposed we have no opposition, but only difference, and therefore could not "think." But, now, let the bodies approach each other till they come in contact. Would we now be able to say they were—together? Of course we could; the previous "useless" experience becomes at once available, the two states can be "opposed," and the mind at once "conceives," "separate" and "together" or together and separate.

We are sometimes—indeed almost always—told that by *comparing* things with one another we are able to think; that thinking is the result of an act of "comparison." But this is entirely erroneous. We performed no act of comparing, seeing that separateness did not exist for us till togetherness occurred, *and then "separate" and "together" were conceived at the same time*, and we had that conception of separate and together, of together and separate—of that "unity" in "duality" which constitutes that act of the mind which we call a *thought*, and which we rightly call a "conception," for

it is the production of something new by the "union" of "opposites." It is "born."

Is a "foot" long or short? If we "oppose" it to a yard it is short. If we "oppose" it to an inch it is long. How big is an inch? An inch cut off one end of the Atlantic telegraph cable is a very small piece, but cut an inch off one's nose—we should consider it to be a particularly large piece. How long is an hour? With the woman you love, it is a horridly "short" time. To hang by the thumbs for an hour would be an intolerably "long" time.

Let us suppose ourselves to be seated together in a large box or room. Suppose a hole, large enough to allow of the passage of the box, were suddenly opened underneath. The hole, extending right through to the opposite side of the world. Suppose the box began to descend down that hole and kept on moving till it came out at the other side. In what direction should we have moved? Of course at the beginning of our journey the direction of our motion would have been downwards. But would it have been downwards during the whole distance? We are compelled to answer—No. For when we passed the centre of gravity we should have begun to move upwards. But how could the direction of our motion change, and yet still be in the *same* direction? To which we reply—that up and down are not things, but "thoughts" about "direction," and a "motion," or rather, a moving body, has—unless some one "thinks" about that moving body—*no direction at all.* The direction of a motion is "up" or "down," according to the conception of opposition—for a thought *is* the "conception of an opposition." While we were going "down," our "opposite" was that side of the earth which we were *leaving;* and accordingly we thought of ourselves as moving *downwards.* But when we passed the centre of gravity, then, that side of the earth which we were *approaching* would be our "opposite," and our "thought" about the "*direction*" of our motion was changed because our "opposition" was changed—though

our "motion" was unchanged—and we should think of ourselves as moving *upwards*. But there is no up or down in "things." Up and down are thoughts about the direction of motion; whether the direction of a motion shall be up or down, depends upon what "opposition" we conceive.

Suppose the earth's motion of revolution round its own axis to be suspended. Suppose we started from the dark side of the earth—the side furthest from the sun—with the intention of going to the sun, which was shining upon the opposite side. In such a case our "motion" would never be "down" at all, but would, from the commencement, be "up" towards the sun—that is, if we thought of the sun as being *above* us. If we thought of it as *below* us—which most likely we should—our motion to it would be downwards—downwards all the way till we reached it. Whether we started from this, our dark side, or from the antipodean, or light side, would be entirely immaterial. On the other hand, supposing we started from the sun on our return journey to that side of the earth which was furthest from the sun, the direction of our motion would be "downwards" all the way.

But, on the other hand, supposing this somewhat remarkable journey to have been taken by two persons, one of whom did not know when they passed the centre of gravity. To that person the "direction" of the motion would indeed be "downwards" all the way; for his "opposites" would be the sun, from whence they came, and the further side of the earth to which they were moving. But to the other traveller who *knew* when they passed the centre of gravity—to *him* the motion would then be upwards, for *his* conception of opposites would *cease* to be the sun and the further side of the earth, and would be changed to the opposition of the further side of the earth and the centre of gravity. For if a person be at the centre of the earth, and wish to get to its surface—that is, if his "conception of opposition" be the centre of gravity and the surface of the earth, he must—

whether he move north or south or east or west—move *upwards* to get there. But if he wants to get to the sun, his motion will be upward or downward according as he thinks the sun to be above or below him.

But does not this look very like one of Mr. Spencer's "irrationalities?" Like that "ship anchored at the Equator" (see page 55, "First Principles").

Not in the least. There is no east, no west, no up, no down, in "things"—no long, no short, no fast, no slow. These are only "thoughts"—conceptions of opposition created by the act of the mind. Things are long or short, up or down, east or west, according to the opposites conceived by the thinker: to the Scotchman, England is south; to the Italian, it is north. All we know about things—are their differences, which exist of themselves *whether man exist or not*. But their "oppositions"—*which have no existence other than as acts of the mind*—"*exist*" "*only*" *as* "*thoughts*"—a thought being the conception of opposites. When we know the nature of a thought—when we say of a motion that it can be either up or down—can—according to the oppositions conceived by two persons—be up and down at the same time, we simply recognise the fact that different oppositions respecting a motion, or anything else, can be conceived by different persons at the same time, the explanation of the seeming "irrationality" is easy, and the paradox vanishes. All we know of physical things is their differences. All we "conceive" about them are relations of "opposition," and these "relations" have no existence other than oppositions conceived by some thinker, and this is what is really meant by the "relativity" of knowledge.

I do not know what the world and anything else, or everything else, are in themselves; I do not know what *I* am in myself; all I know is that the total of "things" is "different" from "I," and that "I" am different from the total of things. And all I know in regard to *thinking about them* is, that "I" is always "opposite" to not—I, and sub-

jective and not—I is always opposite to "I," and objective. But what "I" is in itself, and what not—I is in itself, I do not know. All I know about them is, that regarded as "things," the one is always "*different*" from the other; but regarded as thoughts *about* things, the one is always "opposite" to the other. Such is my thought or opinion about the "relativity of knowledge."

To resume our consideration of opposites:—

Suppose two men on "opposite" sides of a river. The one invites the other to come across to him, and says, "Come 'here.'" The man on the opposite side says, "No, come 'here.'" Are *both sides* of the river "here?" That sounds rather like "alternate impossibilities!" How is it that neither of the men perceives any such "alternatives?" *Because every one knows "practically" the nature of the act we call thinking,*" and, considering that thinking or conceiving oppositions, is an operation which every one is constantly performing—more or less—it would be strange if they did not. One man continues, "Don't stay 'there' talking, but come 'here.'" The other replies, "Don't *you* stay talking '*there*,' but come '*here*.'" Where is "here?" It is opposite to "there." Where is "there?" It is opposite to "here." Is it "conceivable" that a man could get to the "*other*" side of a river? No, it is not. For what to him *was* the "other" side, becomes to him "*this*" side when he gets "*there!*" Very pretty, is it not?

Thus we see that "Sensation" is the "consciousness" of "differences;" and Thought is the "conception" of "opposites." And it seems to me that, rightly understood, the science of metaphysics is, of all others, the easiest and simplest. In fact, it is ridiculously simple.

The next thing to be considered is—"Memory." When I "remember," is it an act "performed" by me, or something "done" to me of which "remembering" is the result? Sometimes remembering seems an act of me, sometimes it seems "not—me," acting upon "me." I remember thoughts,

I remember things. I suppose it must, in the case of remembering thoughts, be a result of mental association; and in the case of remembering things, a case of physical association.

But *how* I remember, and *what* I remember, is of comparatively small importance. But how I shall *designate*, and in what way I shall *treat* what I remember, is of the very highest importance, for "*remembering*" *is often confounded with* "*thinking.*" "Memories," as well as Thoughts, are as often as not called "Ideas." I think, for instance, of a beautiful woman. I am supposed to have an "idea" of the "woman" as well as that she is beautiful. I am supposed to "conceive" the "woman." Now one of these words, the word "woman," is not a conception at all, but only a "remembrance." A "woman" is the name of a group of physical experiences; is the name of a group of remembered sensations. How can I "conceive" anything "physical?" If I could, then the said conception of "woman" would have a physical existence; in fact, I should have "created" her; whereas, I have simply "remembered" her. The word "woman" stands for a remembered group of sensations. It does not stand for an "Idea" at all; at least, does not properly stand for an "Idea."

But the word "beautiful" *does* stand for an "Idea"—a "thought." It is the opposite of ugly. It is one half of the unity composing duality, Ugly—beautiful, beautiful —ugly. It is universally supposed that a word expresses a thought. There could not be a greater mistake. A word merely "names" one opposite of a thought. "Beautiful," "names" only one half of that "one"-ity, of which ugly is the other and opposite half. If, while a man says "beautiful," he has its opposite—"ugly," present in his mind, then he "*thinks*"—"beautiful," for thinking is the conception of opposites, but if he says—"beautiful" *without* having in his mind its opposite—"ugly," he does *not think*, but only utters a sound. I do not mean to say that he is conscious of *mentally uttering* that opposite. But the hearer can practi-

cally tell whether or not he has it in his mind. For if he truly "conceives" beautiful—ugly, and speaks or says—"beautiful," then there will be present in his speech what is called "emphasis." If he does not "think," but merely "utters" the *word* beautiful, then there will be no emphasis —that is, there will be no emphasis *consequent upon the mental effort of "conceiving;"* but only such emphasis as is consequent upon such an amount of *merely physical effect* as is needed to produce the sound or sounds we call the word. It is erroneously supposed that when a man writes a book, or indeed writes anything, he puts down his "thoughts" upon the paper on which he writes. Instead of so doing, he puts down merely one of the names of a pair of opposites, if it is a thought; if it be a sensation, he puts down a word which differentiates some one thing from all other things. For instance, the word or name "woman" differentiates, or is the name of a something which is different from all other existing things. The conception of opposites is a mental "act" and constitutes a "thought." The "name" of a "thing" is the name of a sensation—of a "difference" existing between it and other things. A name of difference is not an opposition. The name of a sensation, of a thing, does not indicate what that is from *which* it differs. It cannot do so, because it differs from all things. When I say "blue," I affirm a difference, but that difference may be yellow or black or brown or red or any colour; but "beautiful" can be "opposed" to "ugly" *only*. There is in truth no such "*thing*" as beauty, no such "*thing*" as ugliness. They are not things, but *thoughts about* things. Recognising this truth we can well understand how standards of beauty differ so widely, just as standards of morals differ. For just as standards of beauty arise out of *thoughts about things,* so do standards of morals arise out of *thoughts about actions;* and that there should be such difference in the standards is to be expected in the case of the one as in the case of the other.

How it has arisen that memories of things should have come to be called ideas—a word which would seem to belong to thoughts alone—is, I think, not difficult to understand. It has largely arisen from that kind of mental action which we call "imagining."

I have, for the first time, let us say, seen a person using a two-pronged fork. I leave the place where I saw it. A little while afterwards I see some one eating bread and cheese. The cheese lies upon the surface of a slice of bread. The person cuts off a piece of the cheese, sticks the point of his knife into it, and conveys it to his mouth. I "remember" the two-pronged fork when I do so. I am said to have an "idea" of that two-pronged fork. I begin to think about that two-pronged fork. I see how useful it is; how much it is superior to the point of a knife for lifting food to the mouth. It can lift several pieces at the same time. But I think, respecting it, that if a piece is smaller than the distance between the two prongs, it cannot be lifted. But—as the saying is—"a thought strikes me," an "idea" comes into my head. I "suppose" the distance between the prongs remaining as before. I suppose—I picture to myself—I *imagine*—I "*see*" "In my mind's eye, Horatio"—the fork with another prong *between* the two. I have "imagined" *a new collocation of matters*. In fact, I have "imagined" a state of things which for me never before existed. I have *imagined* a *three*-pronged fork. I apply to the proper workman. I succeed in communicating my "idea," my "imagination," my "conception," to him, and my conception is what is called "realised"—concreted. The workman makes me a three-pronged fork. Other people see that fork, "remember" it, are said to have an "idea" of it. But it is only myself who "conceived, "imagined," that *three*-pronged fork. No other person than myself can have, properly speaking, the "conception" of that fork. It may be described to them, or they may see it, and so be afterwards able to picture it—to have an idea, a notion of it, and so to

remember either the description or the sight of it—but they cannot have a "conception" of it. The only way in which any other person can "conceive" a three-pronged fork, is to perform the same process of "imagining" it, of "inventing" it, as I went through myself. It is thus that the same discoveries, the same new combinations of things, are "conceived," "imagined," by different persons. But a higher power of imagining, of conceiving, was needed to rise from the "point of the knife" to the fork with two prongs, than from two prongs to three, than from three to four; just as it required a greater power of "conceiving," of "imagining," to produce the first rude steam-engine than the complex locomotive of the present day.

Distinctly recognising the fact that though we can generate new "thoughts," we cannot transcend physical experience—cannot create new "things," but can only "conceive," "imagine," "new combinations" of things already existing, new thoughts about them, new combinations of matters, differences, new combinations of events, of successions, of co-existences—it would, nevertheless, seem that man's powers of conception, of imagination, are almost boundless. Witness the "works," the marvellous conceivings, imaginings of poets, painters, architects, statesmen, mechanicians, musicians, philosophers, scientists, moralists, which constitute almost the whole sum of human knowledge. It is, therefore, not strange that "memories" and "imaginations" should come to be called "ideas," for, like "thoughts," they seem almost wholly mental; and little harm ensues if they be not mistaken for "thoughts."

We thus arrive at our final definitions and classifications.

Sensations, consciousnesses of differences, are the result of action from without upon an "I," and during which the "I" is wholly passive; but it is not passive in regard of other things, for I think, I imagine, "while" I am being so acted upon. In regard to these I am active. But in regard to sensations I am passive.

A thought, is the conception of an antithesis. It is a unified duality resulting from a conception of oppositions, each one of which fits its particular opposite. Advancing can be opposed only to receding, and receding to advancing, and to no other opposites. But other pairs of opposites may have very nearly the same meaning: as progression and retrogression, retreating and pursuing. But in physics anything will differentiate anything from anything else.

Memory, I cannot define memory. I do not know how the processes of memorition are brought about. I do not know in what they consist. All I can say of them is, that they have for their antecedents some previous consciousness, and may be considered as the results—if they be sensations—of physical association; if they be thoughts of—mental association. Mr. Spencer would, I think, say some previous "*states*" *of consciousness*, which implies that consciousness is a something which can be in various "states." Whereas, consciousness is not a "state" of "consciousness," but a "state" of "I," or "Me." For instance, suppose I "remember" having last last week suffered great pain during the extraction of a much-decayed tooth. The pain was not a "state" of "consciousness," but a state of "*me*" who was conscious of the pain. Consciousness being a state of some living creature capable of being conscious; consciousness without the existence of such a being is, to me at least, entirely inconceivable, unthinkable, unfeelable, unrememberable. Let any one try to imagine pain—which is a state of an *Ego* —*existing by itself;* without any Being existing of which it was "a state!"

Imagining:—the mentally-forming new combinations of things, of thoughts, of memories, and of previous imaginings. Thus, the "I" *Feels* sensations and *Conceives* thoughts, *Remembers* things, feelings, thoughts, imaginings, *Imagines* new combinations of things, feelings, memories, thoughts.

Anything remembered is called an "Idea" of what is remembered. It is not, strictly speaking, an "idea," only a

thought is an idea; but as the physical element is often seemingly almost, if not entirely, absent in a "memory," it seems, so far, to be so "like" a thought as to be called, in common with Thought, an Idea. No harm follows if we do not mistake a "memory" for a thought. Much harm follows if we *do* mistake a memory for a "thought." Does Mr. Spencer ever make that mistake? Let us enquire.

CHAPTER IX.

SOME STATEMENTS OF MR. SPENCER CONCERNING PHILOSOPHICAL PRINCIPLES. "IMPRESSIONS" AND "IDEAS," "VIVIDS" AND "FAINTS," AND FURTHER ULTIMATE SCIENTIFIC IDEAS.

MR. SPENCER'S DEFINITIONS OF SCIENCE AND PHILOSOPHY—"EXISTENCE A CONTINUED MANIFESTATION"—THE DATUM OF PHILOSOPHY—"ALL THINGS MANIFESTATIONS OF THE UNKNOWABLE"—THESE "MANIFESTATIONS DIVISIBLE INTO TWO CLASSES"—IMPRESSIONS AND IDEAS (HUME'S CLASSIFICATION) WHICH MR. SPENCER ALTERS TO "VIVIDS" AND "FAINTS"—OBJECTIONS—THAT A WORD CANNOT BE DETACHED FROM ALL OTHER WORDS — OBJECTIONS — SUBJECTIVE MODIFICATIONS CONSIDERED AS A "SERIES"—OBJECTIONS — THE "SUBSTANCE" OF "CONSCIOUSNESS"—OBJECTIONS.

IN the chapter in "First Principles," headed "Philosophy Defined," Mr. Spencer says:—

Page 134.—"Or to bring the definition [of philosophy] to its simplest and clearest form;—knowledge of the lowest kind is *un-unified* knowledge; science is *partially-unified* knowledge; philosophy is *completely-unified* knowledge." [Italics Mr. Spencer's.]

At page 138 Mr. Spencer says:—"There is no mode of establishing the validity of any belief, except that of showing its entire congruity with all other beliefs."

Page 139.—"The process of proving or disproving the congruity becomes the business of philosophy, and the complete establishment of the congruity becomes the same as the complete unification of knowledge, in which philosophy reaches its goal."

The possibility that some of the beliefs may happen to be erroneous does not seem to have occurred to Mr. Spencer.

"What is this datum, or rather, what are these data which philosophy cannot do without?" Clearly *one primordial datum* is involved in the foregoing statement. Already by implication, we have assumed, and must for ever continue to assume, that congruities and incongruities exist, and are cognisable by us.

At page 142.—"We know nothing more of existence than *a continued manifestation.*"

Page 144.—"We cannot avoid accepting as true the verdict of consciousness, that some *manifestations* are 'like' one another, and some are 'unlike' one another."

Page 142.—"But philosophy requires for its datum some substantive proposition. . . . If philosophy is 'completely-unified knowledge'—if the 'unification of knowledge' is to be effected only by showing that *some ultimate proposition includes and consolidates all the results of experience;* then, clearly, this 'ultimate proposition' which has to be proved 'congruous' with all others must express a piece of knowledge, and not the validity of an act of knowing. Having assumed the trustworthiness of consciousness, we have also to assume as trustworthy some deliverance of consciousness.

"What must it be? Must it not be one affirming the widest and most profound distinction which things present? Must it not be a statement of congruities and incongruities more general than any other? An 'ultimate principle' that is to 'unify' all experience must be co-extensive with all experience—cannot be concerned with experience of one order or several orders, but must be concerned with universal experience. That which philosophy takes as its datum must be an assertion of some likeness and difference to which all other likenesses and differences are secondary. If knowledge is classifying or grouping the like and separating the unlike, and if the unification of knowledge proceeds by arranging the smaller classes of 'like' experiences within the larger, and these within the still larger, then the proposition by

which knowledge is 'unified' must be one specifying the antitheses between two 'ultimate' classes of experience in which all others merge.

"Let us now consider what these classes are.

"Setting out from the conclusion lately reached, that all things known to us are manifestations of the unknowable;"—

—Which properly means, that we know sensations as produced in us by causes external to ourselves, and that we do not know anything of these causes, more than as causing these sensations; or, in other words, we do not know things in themselves. But Mr. Spencer has as yet given no reasons whatever for supposing that all sensations are caused by a *single* cause. We await such reasons.

—"And suppressing, as far as we may, every hypothesis respecting the something which underlies one or other order of these 'manifestations,' we find that the 'manifestations' considered simply as such, are divisible into two great classes, called by some '*impressions*' and '*ideas*.'"

I think it would have been as well if Mr. Spencer had mentioned that the great expounder of this doctrine was David Hume, and the reader is requested to bear in mind that "impressions" or "sensations" are caused from "without," while "ideas" or "thoughts" have their cause "within." In the *Ego*, sensations are caused by external "unknowables;" thoughts are caused by *a* "knowable" or "known"—that is, by "Me."

"The implications of these words are apt to vitiate the reasonings of those who use the words; and though it may be possible to use the words; and though it may be possible to use them only with reference to the differential characteristics they are meant to indicate, it is best to avoid the risks of making unacknowledged assumptions. The term *sensation*, too, commonly used as the equivalent of 'impression,' implies certain psychological theories, tacitly, if not openly, postulates a sensitive organism and something acting upon it; and can scarcely be employed without bring-

ing these postulates into thoughts and embodying them in inferences. Similarly the phrase, *state of consciousness*, as signifying either an impression or an idea, is objectionable. As we cannot think of a state without thinking of something of which it is a state, and which is capable of different states, there is involved a foregone conclusion—an undeveloped system of metaphysics. Here accepting the inevitable implication that the manifestations imply something 'manifested,' our aim must be to avoid any further implications. Though we cannot exclude further implications from our thoughts, and cannot carry on our argument without tacit recognitions of them, we can at any rate refuse to recognise them in the terms with which we set out. We may do this most effectually by classing the 'manifestations' as *vivid* and *faint* respectively."

Which simply means, that, on the one hand, we are to treat all "manifestations" simply as "manifestations," and (if we can) to entirely "refuse" to consider them as effects of some manifesting cause; and on the other, we are to divide all such "manifestations" into two classes—the one as "*vivid*" *manifestations*, and the other as "*faint*" *manifestations;* and at the same time to treat them without any reference to any living, feeling, thinking, remembering, imagining being "by" whom they are or have been experienced, and "to" whom they have been manifested, by producing in him sensations, and who has *himself* "manifested" all those thoughts, memories, feelings, and imaginings which Hume blindly jumbled together under the general name, "Ideas." Mr. Spencer might as well expect us to walk without using our legs. In the opening words of the chapter he seems vaguely to recognise the impossibility of doing what he proposes to do himself, and seems to expect the reader to be able to do, for he writes:—

Page 135.—"Every thought involves a whole system of thoughts, and ceases to exist if severed from its various correlatives. As we cannot isolate a single organ of a living

body, and deal with it as though it had a life independent of the rest; so, from the organised structure of our cognitions, we cannot cut out one, and proceed as though it had survived the separation."

It is not a body deprived of a "single organ" that a man is expected to consider himself, but a corpse, from which Mr. Spencer has taken the life, and yet supposes it to be subject to all those influences, and to be able to perform all those acts of which Life is the indispensable condition. I proceed to the next sentence:—

"The development of formless protoplasm into an embryo is a specialisation of parts, the distinctness of which increases only as fast as their combination increases—each becomes a distinguishable organ only on condition that it is bound up with others which have simultaneously become distinguishable organs; and similarly, from the 'unformed material of consciousness'—[what on earth is that? is it a state of a thing, or is it itself a thing?]—a developed intelligence can arise only by a process, which, in making thoughts defined also makes them mutually dependent—establishes among them certain vital connections, the destruction of which causes instant death to the thoughts."

It is difficult to guess what Mr. Spencer means by a "thought." A thought, I hope I have clearly shown, is an act, and the word death cannot be properly applied to it. I perform the act of jumping over a stone. Mr. Spencer might as well apply the word "death" to my "jump" as to my "thought." On the next page (136) he writes:—

"Because a spoken or written word can be detached from all others, it has been inadvertently assumed that the thing signified by a word can be detached from the things signified by all other words."

Why of course we can. Did Mr. Spencer never open a dictionary? There, every word is detached from all other words, and from the things signified by all other words. I

will "detach" every word in Mr. Spencer's just-quoted sentence, so that each word shall stand alone. I will give a "difference," if it be a thing; the nature of the "sign," if it be a sign; and its "opposite," if it be the "name" of half a thought—that is, one of a pair of opposites. When I say "half," I use that word because I have no choice in the matter. But it is not anything at all without its opposite. We cannot "think" "half" a thought, any more than we can think of a sheet of paper as having only one side. The two opposites as opposites come into existence simultaneously; they have no separate existence.

"Because" or by-cause—the opposite of this is, coming by chance. "A," is a sign which preceding a word indicates to the hearer or reader that what follows will be an "indefinite" affirmation. "*A*" spoken or written word might be any word. "The," is its opposite sign, and indicates exactly the contrary to "A." "Spoken,"—there are two ways of expressing to another a sensation or a thought. "Spoken," is articulated sound; "written," is a pictorial "sign" of a sensation or, of a thought. But there are two kinds of articulated speech. A word may be "said" or "spoken," or it may be "sung." And there is inarticulate speech as well as articulate: as calls of animals, cries, etc. In the present case, "spoken" has "written" for its difference. "Or," is a sign of an "alternative" being about to be stated "or" offered. "Written," is a different of "spoken." "Word," or an articulated sound, has for its different, a cry or some inarticulated sound. "Can be," is a sign indicating that the verb about to be affirmed will be affirmed as possible. If the auxiliary sign had happened to be can-not, then it would be a sign that what was affirmed by the verb would be *im*-possible. In order to make the remaining portion of this exposition as brief as possible, I will only give the opposites or the differents of the words. "Detached," is the opposite of "attached;" "all," the opposite of "some," or its negative "none;" "others," the

opposite of the "same;" "inadvertently," is the opposite of "of set purpose," as "chance" and "design" are opposites; "assumed," is the opposite of "proved," signified—that is, sign-ed or "sign"-ified—its opposite being a thing itself and not a sign of it. "All"—"none," "some," "other"—"same," "words,"—"cries."

It is clear, then, that *any thought or any sensation can be detached from all others.* I do not know exactly what Mr. Spencer means by "thought," but on the opposite page (137) he says, "As before pointed out, *all thought involves the consciousness of likeness.*" To which I give the most direct and entire contradiction. Instead of involving the consciousness of likeness, it involves not only the consciousness of that difference between things, which is sensation, but *also* that *special* difference which is "opposition," and not "likeness." He continues (page 137):—

"The one thing avowedly postulated cannot be known absolutely as one thing—[Mr. Spencer here, without one word of warning or explanation, ceases to speak of "thought," which is an act of the mind, and speaks of "sensation"—sensation of some "*thing*," which can he known only by being *different* from some other thing; for a sensation is the *consciousness of a difference.*]—but can be known only as of such or such a kind—only as classed with other things in virtue of some common attribute."

Now, Mr. Spencer has gone from difference—which is, the fundamental of sensation—to an act of thought; that is of separating some things from some other things, and "classing them" as "like" one another, which requires mental act of "conceiving" that "pair of opposites" which we call respectively, "likeness" and "difference," "difference," and "likeness." The next paragraph commences (page 157):—

"In what way, then, must philosophy set out? The developed intelligence is framed upon certain organised and consolidated conceptions of which it cannot divest itself;

and which it can no more stir without using them than body can stir without help of its limbs."

Exactly. And those "organised and consolidated conceptions" of which "intelligence" cannot divest itself, are precisely those with which we are desired to dispense while analysing those "Impressions" and "Ideas"—those "Vivids" and "Faints"—which are to furnish us with the "Data of Philosophy." We are expected to discuss "Sensation" without anything that *has* "sensations," "states of consciousness," without any Being that is conscious; *to ignore that which it is impossible to ignore—one's own existence, to ignore* the *universal*—the *indestructible—unforgetable knowledge—conviction—intuition—certainty*—call it what you please —that "*I*" *am different from anything else*—other "I's" included—and that everything else is different from *me*. That "I" cannot be merged into any other "I" or any quantity of "I's;" no, not even if that other "I" or "I's," be that inscrutable, that "unknowable" existence of which Mr. Spencer affirms I and all other "I's" and things are "manifestations." My sensations, there can be no doubt, are not caused by myself—unless they be consequent upon my thoughts, and my rememberings are not all caused by me. But my thoughts and my imaginings are not manifestations of some Inscrutable and Unknowable Power, but are acts—manifestations—of me—*me*—"ME." How can I sufficiently emphasise the word? When Mr. Spencer declares that all things known to us are "manifestations" of the "unknowable," what does he mean by the word "us?" When he continues, "And suppressing, so far as we may, every hypothesis respecting the something which underlies one or other order of these manifestations, 'we' find that the manifestations, considered simply as such, are divisible into two great classes, called by some *impressions* and *ideas*."

What does Mr. Spencer mean by "we?" Am "I" a "manifestation." If I am, to what class do I belong?" Am I an "impression," or am I an "idea?" or, am I some-

thing different from both, and so cannot be "classed" with either? So that instead of the sum of manifestations consisting of the "two great classes, called by some impressions and ideas," we must constitute a *third*, viz., that "class" which has or experiences the "vivid" "impressions" and the "faint" "ideas." "I," "we," "us," am, or are, certainly not "like" the class "impressions," or "like" the class "ideas," and to class me with them is about as monstrous an "incongruity" as can well be imagined. Mr. Spencer would seem to have an uneasy consciousness of this fact. Indeed, he has no choice. The facts are too strong for him. Even while he divides his so-called "manifestations" into two classes, he cannot help speaking of himself as not being himself a "manifestation," as not being included in either class, but as different from all those "manifestions" which are the causes of his "impressions;" while all that class which can (properly) be classed as "ideas," are not external to him, but are intuitively known by him to be acts of himself. For as Mr. Spencer himself says, (at page 64), "*Belief in the reality of self is indeed a belief which no hypothesis enables us to escape.*" But I had better go to page 61, where, having concluded his consideration of certain "ultimate scientific ideas" (which we have already criticised, and in so doing, reached conclusions entirely disagreeing with those reached by Mr. Spencer), he proceeds:—

"Turning now from the outer to the inner world, let us contemplate, not the agencies to which we ascribe our subjective modifications, but the subjective modifications themselves. These constitute a series."

A most ambiguous statement. A series is a succession, which may be either continuous or broken. Now the succession of our subjective states is not continuous—except while it lasts. But their succession is broken by longer or shorter intervals of unconsciousness, by sleep, or by any other causes which render us unconscious—as blows, exhaustion, intense cold, etc. We do not have one unbroken series

of consciousnesses, but a series of series of consciousnesses, having varying periods of unconsciousness between. He continues:—

"Difficult as we find it distinctly to separate and individualise them, it is nevertheless beyond question that our states of consciousness occur in succession."

"Occur in 'succession.'"—Then if I at the same time *hear* a band playing—a child squalling—three people talking—a cat mewing—a dog barking—the scream of a locomotive whistle, etc., etc., etc.; if I at the same time *see* the individual men composing the band, and the instruments on which they are playing—the child which is squalling, and some parts of the dress it wears—the cat which is mewing, and its colour—the dog which is barking, and *its* colour—the locomotive which screams, and the engineer who makes it scream, etc., etc.; if I at the same time feel the smell of the smoke a man near me is emitting from a foul pipe—the *touch* of a little stone in one of my boots, etc., etc.—the taste of an apple I am eating, etc., etc.—for it would be tedious to enumerate all the "differences" of hearing—sight—touch—taste—smell—of which at one and at the same time I can be conscious—how can they be said to "occur in succession?" That *some* of our consciousnesses occur in succession is true enough, but from Mr. Spencer's assertion any one would imagine that all our consciousnesses occur in succession, instead of the immense majority of them occuring simultaneously. Nevertheless, Mr. Spencer—as if he had advanced a statement as incontrovertible as that two and two are equal to four—calmly proceeds to ask the extraordinary, the seemingly imbecile question, "Is this 'chain' of states of consciousness '*infinite*,' or '*finite?*'"

Has Mr. Spencer ever come across the statement "that all men are mortal?" If he has, and is of opinion that it is a true statement, he must necessarily be of the further opinion that the supposition that a mortal, or "finite," man could experience an infinite, or "un"-"finite," series of

"states of consciousness," is one which can hardly be entertained. Although we cannot know whether *all* men will die —seeing that we cannot "know" what will take place in the "future," that is to say, that we cannot very well have a *present* experience of the *future*—still a good many people *have* died, and certainly *their* "chain" of states of consciousness was not un-finite, for they all came to an end.

Mr. Spencer calls it a "chain of states of consciousness." Now, certainly, everybody knows that a "chain" consists of an unbroken series or succession of links. If our states of consciousness can be correctly described as a "chain," then, like a "chain," it must be an "*unbroken* succession" —which it is not.

When Mr. Spencer gravely enquires whether this "chain of states of consciousness is infinite or finite?" it is difficult to believe that he is not, in reality, joking—a belief which, considering the assertion he makes in the next sentence, would seem to be unavoidable. He replies, "We cannot say 'infinite', not only because we have indirectly *reached the conclusion* that there was a period when it commenced, but also because all infinity is inconceivable—an 'infinite' 'series' included."

And yet, (at page 192D), in relation to that "persistence of force" (which we found to be a figment), he says, "Hence the force of which we assert persistence is that absolute force of which we are indefinitely conscious as the correlate of the force we know. By the persistence of force, we really mean the persistence of some cause which transcends our knowledge and conception. *In asserting it we assert an unconditioned reality, without beginning or end.*" So we see that, according to Mr. Spencer, infinity is both conceivable and inconceivable, which certainly seems to involve "a contradiction." Nevertheless, Mr. Spencer proceeds:—

"We cannot say 'finite,' for we have no knowledge of either of its ends [although he has just said, "We have in-

directly reached the conclusion that there was a period when it commenced"]. Go back in memory as far as we may, we are wholly unable to identify our first states of consciousness; the perspective of our thoughts vanishes in a dim obscurity where we can make out nothing. Similarly at the other extreme: we have no 'immediate' 'knowledge' of a termination to the series at a 'future' time, and we cannot really lay hold of that temporary termination of the series reached at the present moment. [Well, I should say no one ever supposed it possible that any one *could have* an immediate—that is, a *present*—knowledge of the *future!*] For the state of consciousness recognised by us as our last, is not truly our last. That any mental affection may be contemplated as one of the series, it must be remembered—*represented* in thought, not *presented*. The truly *last state of consciousness* is that which is passing in the very act of contemplating a state *just past*—that in which we are thinking of the one before as the last. So that the proximate end of the chain eludes us, as well as the remote end."

If we recognise the fact that our states of consciousness constitute only a broken, an intermittent series—that they do not constitute a "chain"—we shall have no difficulty in perceiving the invalidity of the above reasoning. I have not only "states of consciousness," but I have also "states" of "unconsciousness." But how do I "know" that I have states of "un-consciousness?" A man can no more be "conscious" that he is "un"-"conscious" than he can have an "immediate" or "present" "knowledge" of the "future." But while I am conscious I can remember the sensations and thoughts which immediately preceded the sensations and the thoughts of which I am now conscious. I can also remember the sensations and thoughts which preceded those which preceded the sensations and thoughts which preceded those which preceded those of which I am now conscious. It is not needful to my argument to say how many other preceding thoughts and sensations I can remember. It is sufficient

that I can remember *some* preceding thoughts in the series or chain which has been momently lengthening since I ceased to be unconscious. Now, let us suppose I awake out of a perfectly healthful and dreamless sleep. When I do so, I immediately begin to have sensations, and to think. But these sensations and thoughts have *no immediate antecedents*. They constitute the "commencement" of a "new" series. They are the first links of a new chain, not the continuance of an existing series—of an existing chain. I *know* that I have been "un"-"conscious," because the sensations and thoughts of which I am now conscious *have no immediate antecedents*. I am conscious of a beginning of consciousness; which, *having* a beginning, must necessarily be finite.

I "remember" that I have previously had thoughts and sensations, but these sensations and thoughts are separated by a gap from those which I now feel and think: a gap of unconsciousness. I begin to try to "remember" what was the last of the sensations or the thoughts preceding my "present consciousness," and I come to the conclusion that the last sensation I had was, say, hearing the clock strike one, and after that I can remember nothing, that I ceased to be conscious; and I am, of course, obliged to believe that the series of thoughts and sensations—or my previous state of consciousness—could not be infinite, for it came to an end.

Mr. Spencer reasons as if, because we could not *perceive* a last state of consciousness to be a "last" state, there could be no certainty of there *being* a last state. It is not *thinking about a last state* that is needed to constitute a last state, but the cessation of succession. First and its opposite last, or last and its opposite first, are not "sensations," or "memories," or "imaginations," but "thoughts" about states of consciousness. A given state is the "last" state if no fresh state succeeds it. If no other state *immediately precedes it*, it is a first state. I think it is quite clear that neither the "proximate end of the chain, nor the remote end, eludes us;" though it is quite certain that the

first commencement of the *first series* cannot be remembered, because the power of remembering develops slowly. And it is also certain that the last sensations and thoughts of the *last series as* the last will elude us, because we shall be dead. In the next paragraph Mr. Spencer says:—

Page 62.—"Now to represent the termination of consciousness as occurring in ourselves, is to think of ourselves as 'contemplating' the cessation of the last state of consciousness:" and this implies a supposed continuance of consciousness after its last state, which is absurd, and reminds one of the Irish drill-sergeant, who, disgusted by the manner in which his "gentlemen volunteers" have responded to the order to "toe a line," exclaims, "Jintlemen, do you call *that* toein' a line? Just come out o' the ranks and *look at yourselves!*"

What Mr. Spencer says is quite true of the last of the series of the last link of the last chain, for as I said above, the person would be dead. There would be no fresh chain, no new series of state of consciousness in which he could think about the last of his previous states of consciousness. But I will suppose circumstances in which Mr. Spencer's reasoning would be pertinent.

I will suppose the existence of a single man. I will suppose there never was any other man before him, and that during his existence there will be no other man. I will suppose that he never sleeps, that no accident ever renders him insensible—in fact, that he never is *un*-conscious—also that consciousness has arisen gradually in him, as it does in an ordinary infant. Now such a man having only one series of states of consciousness—for it would never be broken—would be incapable of knowing whether his "states of consciousness" would constitute a "finite or an infinite series," or not; for he would have no knowledge of a beginning, and when the end came, which means when he died, he would not be conscious that he was unconscious, so would be unable to remember what was his "last" state of

consciousness. But *one break of consciousness* would be sufficient to enable him to know that his series was not infinite.

I think I have said enough on this particular point, but Mr. Spencer continues to adduce such erroneous statements in support of his assertion, that I must, however tiresome it may be to me, dwell upon them for a little while longer. He proceeds (page 62):—

"In the second place, if we regard the matter objectively, if we study the phenomena as occurring in others, or in the abstract, we are equally foiled. Consciousness implies perpetual change and the establishment of relations between its successive phases."

Of course this is wrong (is Mr. Spencer always wrong?). "Consciousness" implies no such thing. Consciousness is consequent upon the presence and perception of "difference," or upon the "conception of opposites." So long as I perceive a difference, I am conscious. So long as that difference is present to me, I am conscious. To produce a *new* consciousness there must be a change. Perpetual change would produce perpetual changes of consciousness. Simple consciousness does not imply any change at all, only a present "difference" or a present conception of opposites which may endure a long or a short time. Four sentences further on Mr. Spencer continues—reasoning from an improved contingency as if it were a demonstrated postulate:—

"If," he says, "'*if*' *ceaseless change of state is the* '*condition*' *on which alone consciousness exists; then*, when the supposed last state has been reached, by the completion of the preceding change, change has ceased; therefore consciousness has ceased; therefore the supposed last state of consciousness is not a state of consciousness at all; therefore there can be no last state of consciousness." And therefore a horse-chestnut is a chestnut horse.

But, as I have shown, "ceaseless change" is *not* "the 'condition' on which alone consciousness exists," but only of *ceaseless change of consciousness;* and Mr. Spencer's

reasoning applies only to a man who is dead. There *can be* a last state of consciousness; the man's last state of consciousness *was* his last state of consciousness, but the man, being dead, could not *know* that it was his "*last.*" All the other "last" states of each series of his states of consciousness, and all "first" states of each series of consciousness—except those which were experienced before the sufficient development of memory—were, or might have been, known to him, and even his last state of consciousness of the last member of the series was *experienced* by him—known by him—though it could not be *known* to him to *be* the *last.* Nevertheless, Mr. Spencer concludes, respecting *this* "ultimate scientific idea," as if there could not be a doubt about it :—

"Hence, while we are unable either to believe or to conceive that the duration of 'consciousness' is 'infinite,' we are equally unable either to know it as 'finite' or to conceive finite." An assertion which the reader must take for what it is worth.

We now come to the last of Mr. Spencer's "ultimate scientific ideas," from which I have already made a quotation. He begins :—

"Nor do we meet with any greater success, when, instead of the extent of consciousness, we consider its substance."

It seems as if Mr. Spencer could write hardly a line which does not provoke dissent. Can any one be justified who describes a "state" as a "substance?" Anything which can rightly be called a "substance" is capable of existing alone: a something which is able to exist alone is what is *meant* by a "substance." Is there any human being who, knowing what is meant by "consciousness," will assert that consciousness is a "substance?"

"The question—'What is this that thinks?' admits of no better solution than the question to which we have just found none but inconceivable answers."

Mr. Spencer has found only such answers. But I think

we have seen that he found such answers because he reasoned from false premises. If he considers consciousness to be a substance, and that consciousness is that which "thinks," it will not be surprising if his answer to the question, "What is this that thinks?" should prove to be also "inconceivable."

"The existence of each individual as known to himself, has been always held by mankind at large as the most incontrovertible of truths. To say, 'I am as sure of it as I am sure that I exist,' is, in common speech, the most emphatic expression of certainty. And this fact of personal existence *testified to by the universal consciousness of men* has been made the basis of sundry philosophies; whence may be drawn the inference that it is held—by thinkers, as well as by the vulgar—to be beyond all facts, unquestionable.

"*Belief* in the reality of self, is, indeed, a belief which no hypothesis enables us to escape. What shall we say of those successive 'impressions' and 'ideas' which 'constitute' 'consciousness?' Shall we say that they are the affections of something called 'mind,' which, as being the subject of them is the real *Ego*? [Mr. Spencer's italics.] If we say this, we manifestly imply that the *Ego* [Mr. Spencer's italics] is an entity. Shall we assert that these 'impressions and ideas' are not the mere superficial changes wrought on some thinking substance, but are themselves the very body of this substance—are severally the modified forms which it from moment to moment assumes? This hypothesis, equally with the foregoing, implies that the individual exists as a permanent and distinct being; since modifications necessarily involve something modified. Shall we then betake ourselves to the sceptic's position, and argue that we know nothing more than our 'impressions and ideas' themselves—that these are, to us, the only existences; and that the personality said to underlie them is a mere fiction? We do not even thus escape; since this position, verbally intelligible, but really unthinkable, itself makes

the assumption which it professes to repudiate. For how can 'consciousness' be wholly resolved into 'impressions and ideas,' when an 'impression' of necessity implies something impressed? Or again, how can the sceptic who has decomposed his consciousness into impressions and ideas explains the fact that he considers them as *his* 'impressions and ideas?' Or once more, if, as he must, he admits that he has an 'impression' of his personal existence, what warrant can he show for rejecting this impression as unreal while he accepts all his other impressions as real? Unless he can give satisfactory answers to these queries, which he cannot, he must abandon his conclusions, and must admit the reality of the individual mind."

When Mr. Spencer says, "Belief in the reality of self is, indeed, a 'belief' which no hypothesis enables us to escape," he uses a word which does not fully express the fact. I do not "*believe*" in the "reality" of myself—I "*know*" it. And not until I am furnished with evidence to the contrary which shall be stronger than that which is testified to by "universal consciousness of man," I shall continue to assert that I do not merely "believe" in my "personal existence," but that I *know* it. *In fact, I have no option.* I cannot "*not* know it." Let us see what Mr. Spencer can advance to shake that knowledge—to prove that it is a delusion. He proceeds (page 64):—

"But now, unavoidable as is this belief [not "*belief*," but "*knowledge*"] established though it is, not only by the assent [not "assent," but "assertion"] of mankind at large, endorsed by divers philosophers, but by the suicide of the sceptical argument—it is yet a belief which reason, when pressed for a distinct answer, rejects. One of the most recent writers who has touched upon the question—Mr. Mansel—does indeed contend that in the consciousness of self we have a piece of *real knowledge*. The validity of immediate intuition he holds in this case unquestionable; remarking that, 'let system-makers say what they will, the

unsophisticated sense of mankind refuses to acknowledge that mind is but a bundle of states of consciousness, as matter is (possibly) a bundle of sensible qualities.' On which position the obvious comment is, that it does not seem altogether a consistent one for a Kantist, who pays but small respect to 'the unsophisticated sense of mankind when it testifies to the objectivity of space.' "

On which latter position the "obvious comment is," that the rightness or wrongness of whatever may have been advanced by Kant or by Mr. Mansel respecting the "objectivity of space," does not affect the rightness or wrongness of what Mr. Mansel says, "when he contends that on the consciousness of self we have a piece of real knowledge." Mr. Spencer continues:—

"Passing over this, however—[as if Mr. Spencer generously refrained from using an argument favourable to his own assertion, though in fact his comment on Mr. Mansel is not an argument at all]—passing over this, however, *it may readily be shown* that a cognition of self, properly so called, *is absolutely negatived by the laws of thought.*"

"*It may readily be shown.*" Is this a fit introduction to reasoning which is to be so overwhelmingly strong and clear, that that knowledge of "personal existence testified to by the universal consciousness of men,"—that that "belief in the reality of self," which "is, indeed, a belief which no hypothesis enables us to escape," shall be proved to be a delusion? That the "belief which no hypothesis enables us to escape" shall, nevertheless, be encountered by a "hypothesis" which shall not only enable us to "escape" that "unescapable" "belief," but shall "readily show" that such belief was "a belief admitting no justification by reason;" nay, indeed, was "a belief which reason, when pressed for a distinct answer, rejects?" The word "may" is but the "sign" of contingency, not of certainty. It indicates only the "possibility" of "showing," and does not *undertake* to show. Mr. Spencer says, "that it may

'readily be shown' that a cognition of self, properly so called, is absolutely negatived by the laws of thought." What are the "Laws of Thought?" Mr. Spencer has not set forth what he thinks them to be. "Thought" has one law, and that is, that we can only think by conceiving oppositions. There is no "thought" in physical things. There is no thick, there is no thin, in "*things*;" no large, no small; no going, no coming; no here, no there; no straight, no crooked; no wild, no tame; no number; no place. There is nothing *but* the "things." In "time" there is no slow, no fast; no long, no short. These and all other oppositions are thoughts of man *about* "things" (and also about thoughts), the names of mental acts performed by man, and have no other existence. I must quote the remainder of the paragraph before making further criticism:—

"The fundamental condition to all consciousness, emphatically insisted upon by Mr. Mansel, in common with Sir William Hamilton and others, is *the antithesis of subject and object*, and on this 'primitive dualism of consciousness,' from which the explanations of philosophy must take their start, Mr. Mansel founds his refutation of the German absolutists. But now, what is the corollary from this doctrine, as bearing on the consciousness of self? The 'mental *act*' in which self is known, implies, like every other 'mental act,' a perceiving subject and a perceived object. If, then, the object 'perceived' is 'self,' what is the 'subject' that 'perceives?' or if it is the 'true' self which 'thinks,' what *other* 'self' can it be that is '*thought*' of? Clearly, *a true cognition of 'self' implies a state in which the knowing and the known are 'one'*—in which 'subject' and 'object' are *identified;* and this Mr. Mansel rightly holds to be the annihilation of both.

"So that the personality of which each is 'conscious,' and of which the existence is to each a fact, beyond all others the most certain, is yet a thing which cannot truly be known at

all; knowledge of it is forbidden by the very nature of thought."

Before proceeding to consider the above statements, it will be necessary to make some further remarks respecting the "laws" of thought, and the "facts" of sensation.

With regard to "thought," it is a "law" that *we can think only one thought at one time. A "thought"* is a *mental act*—the act of "conceiving" opposition or antithesis. We can no more perform two of these acts at once than we can take two steps at once. I distinctly "remember" the "thought" or the "sensation" immediately preceding the thought I am thinking, and according to the goodness of my memory, a certain greater or less number of thoughts preceding that one. The further they are from my present thought the more imperfectly I remember them. Beyond a certain point I cease to be able to remember. But if some of my thoughts have been very vividly conceived, I can — though they have occurred a good while previously — remember them; while, some which have been less vividly conceived, I cannot—though they may have occurred only a short time before—remember.

With respect to the thoughts which shall succeed my present thought, and how they arise, I shall not at present make any remarks.

But though I can conceive only *one thought at once, I can have any number of sensations at once*—sights, sounds, touches, tastes, scents—innumerable. But what I hope the reader will especially bear in mind respecting sensation is, that *sensation is not; a "mental act"* is—so far as the person "sensed" is concerned—no "act" at all, but is a "state" caused in him by the *action upon* him of something external to him. Also, that what we call a man's body is "external" to him.

As Mr. Spencer has asserted that a cognition of self, properly so-called, is absolutely negatived by the "laws of

thought," I will, in so many words, set forth the two laws of thought as stated above.

First.—That a Thought being a mental "act" cannot be performed except there be existent something capable of performing that act. The fundamental conditions needed for the performance of such act are previous "sensal" experiences. These experiences are sensations, either past or present. When the "existence" which acts has previously thought or thoughted or thinked, the thoughts which it has thought or thoughted or thinked themselves furnish conditions of further thought. The act performed in thinking is the conception of a relation of opposition, of antithesis; as, thick opposed to thin—thin opposed to thick. As I have previously stated, there is no such "*thing*" as "thick" or "thin," because the same thing is thick or thin according to what opposite we conceive. These oppositions are conceived by the "I"—I beg its pardon—conceived by the "existence"—that is, if the "existence" "exists," such conception is the "act" performed by the "existence" when it "thinks."

Second.—The "existence" can perform only *one* such act *at once*, just as a man cannot jump two times at once. Such, as it seems to me, are the "laws of thinking."

A present "consciousness," or "cognition" of "self"—"properly so called"—or otherwise, is not a "fundamental" or necessary "condition" of thinking. If the existence "opposes" itself to some other existence—as when the "existence" thinks—*I* am stronger than that *other* "existence," the "existence" "opposes" itself to that "other" existence, and has a "cognition" of self. But it may be so deeply engaged in thinking as not to be directly conscious of its own existence—that is, *does not oppose its own to some other existence.*

Mr. Spencer speaks as if there were only one kind of consciousness. There is only one kind of thought—but of how many kinds of consciousness of differences is an

"existence" capable of being simultaneously conscious? Consciousnesses of sight, sound, smell, touch, taste; and all experienced *while* the "existence" thinks, or does not think, as the case may be.

In the next sentence Mr. Spencer says:—

"And on this 'primitive *dualism* of consciousness,' from which the explanations of philosophy must take their start, Mr. Mansel founds his refutation of the German absolutists."

The "primitive" dualism of which Mr. Spencer speaks, is not the "*primitive* dualism" of "sensal" consciousness—which is merely consciousness of differences—but is the "*final* dualistic action" of thought, which is an "act" of the mind working in and on itself; while the "*primitive* dualism"—which is not an "act," but a sufferance—is the result of the action upon a creature of something else, and during which it is entirely *passive*.

The latter action, of one existence upon another existence which is capable of being conscious, and the production in it of sensation—of consciousness—we have already considered in the form of "touch" acting upon a creature of very low organisation. We then found that that consciousness was composed of a "dualism"—of a "difference," which cannot, from its very nature, be singular, seeing it includes two factors—self and not-self, and which thus constitutes the *true primitive* "dualism" of consciousness of difference—of sensation;—primitive, because it is the first sensation; universal, because it accompanies, consciously or unconsciously, all other sensations and thoughts, but which must not be confounded with the—not primitive—but *final* "dualism" of "thought." The "primitive" dualism of "sensation"—the me and the not-me; the self and the not-self, refers to "things" not to "thoughts." All "things" are not-me, exist independently of me, exist whether "I" exist or not. Whereas my thoughts owe their existence to "me," and *without* "me," *have no* existence. "Subject" and "object" include only my grouping together into

a unity, and the opposing *all* physical existences to my own existence, but leaves out—simply because it cannot include—the thought "conceived" by "me," which "thoughts" are of such an extraordinary nature and character that we cannot say of them either that they are myself or that they are not "myself." They cannot be brought within the category either of me or not-me, or even of subject and object. They are different both from myself and physical things. This last, widest, deepest, and seemingly most un-understandable mystery of existence, Mr. Spencer—like Mr. Mansel and Sir William Hamilton—never perceives, but imagines that the total sum of the facts of existence can be expressed with equal correctness and completeness, whether we call them subject and object, self and not-self, me and not-me.

Mr. Spencer says, above, "It may readily be shown that a cognition of self, properly so-called, is absolutely negatived by the laws of thought."

I think I have shown that the law of sensation—for the law of thought has nothing to do with the matter—the law of sensation being that of difference—to have a cognition of self, without at the same time having a cognition of *not*-self, is absolutely impossible. It is by the law of sensation, not by the law of thought, that we at the same time have a cognition of self and a cognition of not-self. We cannot be "conscious" of one without at the same time being "conscious" of the other.

When Mr. Mansel and Sir William Hamilton asserted that "the fundamental condition to *all* consciousness is the antithesis of subject and object," they made a fatal mistake. The fundamental condition to all physical consciousness or sensation is not the "antithesis" of subject and object, but the "differences" between self and not-self, of me and not-me, and is the same, in all creatures capable of consciousness, as it is in man. A flea is conscious of the difference, me, and not-me, which is a "sensation;" but does any one suppose a flea

to be capable of the "thought" subject and object. No doubt the flea is as conscious as man is of its "difference" from the things with which it comes in contact, but not of its *difference from all things at once* as man is. "Subject and object" are, or is, a "thought" about *all that, or rather, all those,* which constitute or constitutes (one cannot be grammatical while treating of that which is a "unity" composed of a "duality," and is, in relation to its components, plural, but as a result is singular), constitute or constitutes, not only the "difference," but also "opposition" betwixt itself and the not-self. Man thinks of himself as the "subject" of the action of that totality of things which he groups together as objective, or as object. Consciousness of self and not-self can stand alone, as it does in animals, but subject and object, are *plus* self and not-self. A man can "*think*" subject and object, while he "*feels*" self and not-self, has, at the same time, the sensation of difference and performs the act of thinking, which, to me, seems to dispose of Mr. Spencer's "impossibilities."

Mr. Spencer says:—"The mental act in which self is known, implies, like every other 'mental act,' a perceiving subject and a perceived object." But a sensation by which self and not-self are simultaneously known, is not a mental "act," but a "sufferance," and what is perceived is the difference between an object and that upon which it acts.

"If, then, the 'object' perceived is 'self,' what is the 'subject' that perceives?"

"What is perceived is the 'difference' between self and not-self, which can only be known together and simultaneously.

"Or if it is the true self which thinks, what other self is it that is thought of?"

"In 'sensation' there is no 'thought' at all, but only consciousness of 'difference.'

"Clearly, a true cognition of self implies a state in which the knowing and the known are one; in which subject and

object are identified; and this Mr. Mansel rightly holds to be the annihilation of both."

A "true cognition of self" is only possible when the "knowing and the known—when not subject and object, but self and not-self, are *different;* and to think of them as "one," or as "identified" or "fused into one," is—seeing that consciousness is consciousness of *difference*—an impossibility; and that which cannot exist cannot be "annihilated."

"So that the 'personality' of which each is conscious, and of which the existence is to each a fact beyond all others, the most certain is yet a thing which cannot truly be known at all; knowledge of it is forbidden by the very laws of thought."

The truth is directly the opposite of Mr. Spencer's final statement. The laws of thought are not concerned at all in the cognition of self, but only the "fact" of sensation; and the condition or law of sensation being the consciousness of differences, the *non*-cognition of self and not-self at the same time is an impossibility, for where there exists only one thing there cannot be "difference," and consequently, there being no difference, there cannot be consciousness. But there *is* consciousness. Therefore, there *is* difference. There is more than "one" thing. If there *be* an unknowable, there must *also be* that which "does not know."—What?—I? Thou? He? She? It? We? You? They? Them? Here? There? Where?

CHAPTER X.

MR. SPENCER'S POSTULATE THAT "VIVIDS" OR IMPRESSIONS AND "FAINTS" OR IDEAS ARE ALIKE MANIFESTATIONS OF AN UNKNOWABLE AND INSCRUTABLE POWER, OR ABSOLUTE FORCE.

MAN'S SENSE OF PERSONAL INDIVIDUALITY ABSOLUTE—THAT THE DIFFERENCE BETWEEN "FAINTS" AND "VIVIDS" IS A DIFFERENCE OF DEGREE ONLY, NOT OF KIND—THE "IDEA" A FEEBLE REPETITION OR COPY OF THE ORIGINAL "IMPRESSION"—"LIKE IT, ONLY MUCH LESS DISTINCT"—"FAINT MANIFESTATIONS CONSTITUTING THOUGHT"—IMPRESSIONS OR VIVIDS ARE "ORIGINALS," WHILE IDEAS OR FAINTS ARE "COPIES"—ALL MANIFESTATIONS OF THE UNKNOWABLE DIVISIBLE INTO TWO CLASSES, "SUBJECT" AND "OBJECT," "SELF" OR "EGO," AND "NOT"-SELF OR "NON"-EGO—OBJECTIONS—ARE MANIFESTIONS DUE TO A "SINGLE" CAUSE OR TO "SEVERAL?"—THE PRIMORDIAL POSTULATE WHICH, ACCORDING TO MR. SPENCER, "PHILOSOPHY" REQUIRES AS ITS "DATUM."—"SELF AND NOT-SELF, EGO AND NON-EGO, SUBJECT AND OBJECT, ARE MANIFESTATIONS OF ONE CAUSE, THE UNKNOWABLE; THUS THE UNIFICATION OF SCIENCE IS COMPLETE, AND PHILOSOPHY REACHES ITS GOAL"—OBJECTIONS.

I HOPE I have made it clear that every man unavoidably and intuitively is conscious of himself as being absolutely different from all other things whatsoever, and that his individuality cannot be even "supposed" to be merged in that of any other individuality. It cannot, of course, be doubted that man owes his existence to something other than himself. But to whatever cause or causes he owes his existence, one thing is certain—that he is so constituted as to be unable even to "think" of himself as other than individual. His existence, whether it be the result of "creational" causation, or only of "chaugal" causation, or a "manifestation" of an "unknowable," "inscrutable" "force," is of such a nature as to be entirely separate from all other existences. Return we now to Mr. Spencer's "faints" and "vivids."

What Mr. Spencer calls "vivids"—which word stands for "impressions" or sensations—may properly enough be called "manifestions" of something or somethings, for the "I" knows that it does not itself cause them. But the "faints"—what can be said of them? What does that word stand for with Mr. Spencer? The two words do not seem to indicate any differences of "kind," but only differences of "degree." At page 144 Mr. Spencer says:—

"And first a few words on this most conspicuous distinction which these antithetical names imply. Manifestations that occur under the conditions called those of *perception* [sensation] . . . are ordinarily *more distinct* than those which occur under the conditions known as those of *reflection, or memory, or imagination, or ideation.* Those 'vivid' manifestations do, indeed, sometimes differ but little from 'faint' ones. . . ."

Page 145.—"Manifestations of the 'vivid' order precede, in our experience, those of the 'faint' order; or, in the terms quoted above, *the 'idea' is an imperfect and feeble 'repetition' of the original 'impression.'* To put the facts in historical sequence—there is *first* a presented manifestation of the vivid order [a sensation], and then, afterwards, there may come a represented manifestation that is *like it, except in being much less distinct.* . . . [Such can only be a memory.]"

Page 146.—"These two 'orders' of manifestations form concurrent series; or rather, let us call them, not series, which implies linear arrangements, but heterogeneous streams or processions. These run *side by side* . . . always along with the vivid manifestations, even in their greatest obstrusiveness; analysis discloses *a thread of 'thoughts' and interpretations 'constituted' of the 'faint' manifestations.*"

Page 149.—"The successive *'faint' manifestations 'constituting' thought,* . . . the accompanying faint manifestations which I distinguish as my *ideas.*"

Page 151.—" . . . And are yet capable of being produced by the faint manifestations we call ideas."

Page 153.—"Manifestations of the one order are "vivid," and those of the other are "faint." *Those of the one order are 'originals,' while those of the other are 'copies.'* . . . The conditions under which manifestations of either order occur, themselves belong to that order; but whereas in the 'faint' order the conditions are *always* present, in the 'vivid' order the conditions are often *not* present, but lie somewhere *outside* of the series."

" What is the meaning of this? The foregoing analysis was commenced in the belief that the proposition postulated by philosophy must affirm some ultimate classes of likenesses and unlikenesses, in which all other classes merge; and here we have found *that all manifestations of the unknowable are divisible into two such classes.* What is the division equivalent to?

" Obviously it corresponds to the division between object and subject. This profoundest of distinctions among the 'manifestations' of the 'unknowable' we recognise by grouping them into *self* and *not-self.* These *'faint'* manifestations forming *a continuous whole, differing from the other in the quantity, quality, cohesion,* and *conditions of existence of its parts, we call the 'Ego;'* and those *'vivid'* manifestations indissolubly bound together in relatively immense masses and having *independent* conditions of existence, we call the *non-Ego.* Or rather, more truly—*each order of manifestations carries with it the irresistible implication of some 'power' that 'manifests' itself;* and by the words *Ego* and non-*Ego* respectively, we mean the 'power' that manifests itself in the 'faint' forms, and the 'power' that manifests itself in the 'vivid forms.' [Is not that *two* powers?]

" . . . And the *promordial division of self from not-self* is a cumulative result of persistent consciousness of likenesses and differences amongst manifestations. . . .

" Strictly speaking, this segregation of the manifestations,

and coalescence of them into *two distinct wholes*, is in great part spontaneous, and *precedes all deliberate judgments;* though it is endorsed by such judgments when they come to be made. . . . . *So that in truth these two contrasted orders of manifestations are substantially self-separated and self-consolidated.*"

Like Mr. Spencer, we ask, "What is the meaning of this?"

Throughout the whole of Mr. Spencer's disquisition on the two different kinds of phenomena respectively described as "impressions" or "vivids" on the one hand, and "ideas" or "faints" on the other, it is impossible to help observing that these two different kinds of effects are to be ascribed by us to the action of *two different kinds of causes;* each of which is external to the other. The one—by which is meant the total of physical nature—is called the non-*Ego* or "*physical*" causer. The other is the *Ego* or "*mental*" causer. There are immense numbers of physical causers, which may be briefly defined as the seventy—more or fewer—ultimate elements; each element or ultimate atom being supposed to consist of a group of powers. These powers are not always in action. Their action is contingent upon certain conditions. Unless these conditions are present they do not act. When they do act, the result of their action is what we call "force." Every "force" opposes every other force. Equal amounts of conflicting forces destroy each other. When one force is greater than another, the result of their conflict is some kind of change. The *production* of such change is "*change causation.*"

The great fundamental principle in physics is, that no power can *start* its own action. The commencing to act of any power is the result of the action upon it of some force.

There is, however, one special power which is always acting, and therefore never needs starting. That power is gravity. Besides the remarkable fact that its action is continuous, its mode of action is especially incomprehensible. To say of it that it acts by "attraction," is not in itself more

wonderful than that of other elements—as affinity, cohesity —which attract, but only within extremely *limited* distances, and they must be *brought within* those distances before they can act. But gravity seems to be uninfluenced by distances, however great—except that the greater the distance the weaker the action. What is the radius of gravity of which each atom may be said to be the centre? and how does it "pull" towards its centre? Suppose its radii to be like arms with hands along the whole of their length, and by means of which the "pulling" is effected, and that their pulling is incessant—eternal.

"Repulsion" is to a certain extent comprehensible, because we know where and how the action commences. I push away with my arms, and to the extent of their length I can both push and pull. But when the pulling—the attracting —is to be done *beyond* arm's-length! The earth is 93,000,000 miles from the sun. How—oh, how—how—how—how does the sun "pull" it? and how does the earth at the same time "pull" the sun? Repulsion is, as one may say, child's play. The sun shoots out Force in the shape of Light, which strikes upon the earth. But only a ridiculously small quantity of it strikes the earth, the rest goes careering into space, momently becoming weaker by diffusion—by attenuation— till it meets some force which, by opposing, destroys it, and of which it destroys an equal portion, and there an end. But the "pulling" force! Do what one will it is of no use. It is enragingly incomprehensible. We can only quote the words of the Doge to Othello, and Brabantio's reply—

"What in your own part, can you say to this?"

"Nothing—but *this is so.*"

When "powers" act their modes of action are "forces." These forces can act upon each other so as to produce what is called "the transformation of forces." Any "force" can be transformed into Heat. For instance, Heat can be transformed into electricity, etc. But *no "power"* can be "transformed" into any "other" "power." Gravity, chemic

attractions, chemic repulsions, cohesity, polarity, elasticity, cannot any one of them be transformed into any other. All atoms possess the power gravity, the power chemic attraction, the power chemic repulsion, the powers cohesity, polarity, elasticity. Now Mr. Spencer says (page 154), "each order of manifestations carries with it the irresistible implication of some '*power*' that 'manifests' itself."

Is Mr. Spencer in the right when he describes the *cause* of the "vivid" manifestations, and also the "faint," as identical, as *single*—as a unit, which he calls the unknowable? It would seem that he is not. To bring that which "causes" the "vivids," and also the "faints," in that which he calls the "*Ego*," down to the smallest number, they are certainly at least six, not one, (and it is possible they may be seventy—more or less); for gravity, chemic attraction, chemic repulsion, cohesity, polarity, elasticity, cannot any one of them be transformed into any *other* power. Neither can any atom be *deprived* of any of its powers. Just imagine an atom being "deprived" of its gravific power, or of its cohesity, or of its polarity. It is not the indestructibility of "*Force*" which renders science possible, but *the indestructibility of* "*Powers.*" Forces, as we have seen, are in course of constant destruction. It seems to me that the doctrine of the "Indestructibility of Force" stops the way of science. It is a "superstition."

Then Mr. Spencer's "faints."

Mr. Spencer affirms that the "faints" are *not essentially different* from the "vivids," but are only "faint" "*copies*" of them. So that *faints and vivids differ, not in kind, but only in degree.* The only difference between a "vivid" and a "faint" is the difference between having a vivid *physical experience*, and having a faint physical experience, or of *remembering* such experiences. But "memory" can do no more than present again a past experience. It cannot present anything which was not present in such "past" experience; for it is only a "copy"—and a "faint" "copy"—of it. It cannot present more, but it may present less than what con-

stituted the "original." If it present more, then that which is "more" than the original is not, so far, a "copy," but is itself "original." If it present less, the "copy" is imperfect. For instance—

Let a man suppose himself to be a looking-glass capable of consciousness—capable of sensation and memory, but capable of nothing more. In brilliant gaslight, the interior of a richly-furnished room is reflected on its surface. The glass is "vividly" conscious of the things presented to it: the rich hangings, the splendid furniture, the pictures hanging on the walls, the beautiful ornaments scattered about. The gaslights are suddenly extinguished. The room is dark. The whole "vivid" presentation has vanished. But the looking-glass possesses what we call the power of "remembering." It exercises that power. And by its action it is conscious of a "faint" "*copy*" of that which in actual experience was so "vivid." But the difference between the "vivid" actual experience, and the "faint" "memory" of it, would be only a *difference* of *degree* and, nothing more. The former presentation was "vivid;" the latter, the re-presentation, was "faint," but would re-present exactly and identically—but faintly—what was originally presented; no more and no less.

If an "idea" or "faint" is but a "faint" "copy" of a "vivid" "impression" or "sensation," of what "impression" or "sensation" is the "idea"—the "thought"—"the conception"—of justice—the "opposite" of in-justice—a "copy?" or moderate the opposite of excessive, or old the opposite of new (or if it be some "living" thing that is "old," the opposite of young), or early the opposite of late, or wonderful the opposite of commonplace, or strong the opposite of weak (or feeble, if concerning living things), or generous the opposite of niggardly, or high the opposite of low? *Or of what was the first "imagination" of the steam engine a "copy?"* or of the *first screw*, or of the *first saw*, or of the *first pulley*, or of the *first wheel*, or of the *first "three-*

pronged" fork? Memory can produce only copies; it cannot produce "imaginations," for an imagination being a "new" mental combination of existing things, and having no concrete or physical antecedent existence, cannot be either "vividly" "copied" or "faintly" "remembered." It cannot produce thoughts, for thoughts—whatever may be the nature of their existence, it certainly is not a physical existence, and therefore cannot be "copied." The differences between "impressions" or sensations, and imaginations and thoughts, is not a difference of degree but a difference of kind. Mr. Spencer's "vivids and faints" include neither imaginations nor thoughts, but only experiences of sensation on the one hand, and on the other *remembered* experiences of sensations.

At page 142, Mr. Spencer writes:—"We know nothing more of existence than a continued manifestation."

At page 154.—"The foregoing analysis was commenced in the belief that the proposition postulated by philosophy, must affirm some ultimate classes of likenesses and unlikenesses in which all other classes merge; and here we have found that *all manifestations of the unknowable* are divisible into two such classes. What is the division equivalent to?"

"Obviously it corresponds to the division between *object and subject.*"

Object and subject have no existence except as a relation of opposition conceived by an "I." It is a thought about *Egos* and non-*Egos*.

"This profoundest of distinctions among the manifestations of the unknowable we recognise by grouping them into self and not-self."

We do not "*group*" them. They group themselves. Firstly, the sensations group themselves into self and not-self; then thought groups self and not-self into the objective and subjective. On the opposite page (155), Mr. Spencer says:—

"Strictly speaking, this segregation of the manifestations

and coalescence of them into two distinct wholes, is in great part '*spontaneous*.' [A little further on he acknowledges that this "grouping," this "segregation," is not merely "in great part," but *entirely* "spontaneous."] This cohesive union exhibits itself *before any conscious acts of classing take place*. So that *in truth these two contrasted orders of manifestations are substantially 'self'-separated and 'self'-consolidated.*

"These *faint* manifestations forming a continuous whole *differing from the other in the quantity, quality, cohesion, and condition of existence of its parts*, we call the *Ego;* and these *vivid* manifestations *indissolubly bound together* in relatively immense masses, and having *independent* conditions of existence, we call the *non-Ego*, or rather, more truly—*each order of manifestations carries with it the irresistible implication of some power that manifests itself;* and by the words *Ego* and *non-Ego*, respectively, we mean the 'power' that manifests itself in the 'faint' form, and the 'power' which manifests itself in the vivid forms."

Which is "two" "powers."

The one of which, is the *total sum* of atoms, constituting inorganic matter—each atom being an original underived group of at least six powers—gravity, chemic attraction, chemic repulsion, polarity, cohesity, elasticity; and which are the "powers" which "manifest" themselves to us by producing in us "sensations," "impressions," "vivids."

The *other* power, which "manifests" itself "*to*" itself in Feeling—Remembering—Imagining—Thinking—is the *Ego*, the I, the me, so that instead of their being only one unknowable, inscrutable power, of which—or whom or whatever Mr. Spencer thinks it to be—all things are alike "manifestations," there are, on the one hand, the six powers which constitute the individual atom, and which, in their total sum, "manifest" themselves to us by causing in us sensations, impressions, vivids; and on the other, that other power, that I, *Ego*, me, which "manifests" itself to

itself by Feelings—Rememberings—Imaginings—Thinkings—whose origin we are endeavouring to discover.

At page 156 Mr. Spencer continues:—

"In a very imperfect way, *passing over objections, and omitting needful explanations* [!] I have thus, in the narrow space that could *properly be devoted to it* [!], indicated the essential nature and justification of that primordial proposition which philosophy requires as a datum . . . the "*postulate*," that *the manifestations of the unknowable* fall into the *two separate aggregates* constituting the world of consciousness and the world beyond consciousness.

Page 157.—"In brief our postulates are—an *unknowable power*; the existence of knowable likenesses and differences among the 'manifestations' *of that power*, and a resulting segregation of the manifestations into those of subject and object."

At page 171.—"An 'unknown' cause of the 'known' effects which we call phenomena, likenesses and differences among these known effects, and a segregation of the effects into subject and object."

Mr. Spencer divides all phenomena into two classes. Self and not-self; subject and object. *Both* these classes he ascribes to the action of *one single cause*. This cause he names the *unknowable*. Thus, the "*unification of science*" *is complete, and* "*Philosophy reaches its goal.*"

Do the facts of physical and of mental causation—the facts grouped under the terms faints and vivids, self and not-self, subject and object—justify Mr. Spencer in attributing all of them to a "single" "cause?" I think we have seen that they do not.

Mr. Spencer says (page 30):—"To the mind as it developes in speculative power, the problem of the universe suggests itself. What is it? and whence comes it? are questions that press for solution. . . . A critical examination, however, will prove not only that no current hypothesis is tenable, but also that no tenable hypothesis can be framed."

Which sounds rather odd when we have just read his own statement of "Nature"—that is, the "self and not-self, the "*Ego* and the non-*Ego*," the "subject and object," as being *manifestations of a single unknowable Power;* and that in that statement, "all knowledge" is "unified," and "philosophy" has "reached its goal;" and all things would seem to be accounted for, including a "tenable hypothesis."

But is there any more reason for believing in "*an*" "unknowable power" than for believing in "God?" Is there any more warrant for the one than for the other. In considering Dr. Flint's argument, we found that Matter and Force, acting in fixed ways, which we call laws, were sufficient to account for the phenomena of "Nature;" and that as we could find no time when Matter and Force were not, why should we try to account for them. If we *did* try to do so, and succeeded in accounting for them, should we not then be obliged to account for that which was supposed to account for that which accounted for Matter and Motion, and so on, through an "endless regress of causes?"

It seems to me that Mr. Spencer's theological, scientifical, philosophical, positive, negative, of "an" "unknowable power," must be put in the same category as Dr. Flint's Theological "Creator."

The Theist's beliefs, and their relation to what is called "Revelation," being what we know them to be, we can well understand why he believes the Theos to be a unity. But what warrant has Mr. Spencer for affirming that all things are "manifestations" of *one*, of "*an* Unknowable Power?" Certainly the facts of Nature contradict him. Not to, at present, speak of the *Ego* as an *individual* cause or "power"—the examination we have made into the facts of Nature lead to the unavoidable conclusion that physical phenomena are not caused by a *single* power, but certainly by the eternally-existent and inherently-different plurality of powers which we call gravity, chemic attractions and repulsions, cohesity, elasticity, polarity, and possibly magneticity—nay, even

each of the seventy ultimate atoms may be individual—separate—powers.

Mr. Spencer asserts that the "Ultimate of Ultimates is Force, and that that Force is indestructible," and he is continually crying out respecting opinions with which he disagrees—"Oh, you mustn't say that, because it either directly or implicitly postulates the non-continuity of motion, or the destructibility of Force." Whereas, we have seen that motion is not a "thing" at all, but is a "state" of a body caused by the action upon it of some kind of Force, and that Force, so far from being indestructible, is the only thing that *is* "destructible;" and the sum of phenomena, instead of being "manifestations" of Mr. Spencer's one "inscrutable" "unknowable" "absolute" "Force," are the "manifestations" of various eternally-existent and indestructible "powers," not of a single "Force."

What becomes, then, of Mr. Spencer's unification? and is "philosophy" any nearer than before to its "goal?"

CHAPTER XI.

THE ORIGIN AND THE NATURE OF THE UNIVERSE. THE "CONTRADICTIONS" OF TRANSCENDENTAL PHILOSOPHY SEEM TO RENDER ANY CONCEPTION OF THE "INFINITE," OR OF "CREATION" IMPOSSIBLE.

ACCORDING TO MR. SPENCER, "NO TENABLE HYPOTHESIS OF THE ORIGIN OF THE UNIVERSE CAN BE FRAMED"—"THREE VERBALLY INTELLIGIBLE SUPPOSITIONS"—THAT IT IS "SELF-EXISTENT," OR "SELF-CREATED," OR "CREATED BY AN ETERNAL AGENCY"—THE NATURE OF THE UNIVERSE—WE ARE OBLIGED TO SUPPOSE SOME CAUSE FOR OUR SENSATIONS—THE FUNDAMENTAL ERROR, THAT WE MUST SUPPOSE A FIRST AND ONLY CAUSE—A SAVAGE'S IDEA OF CAUSATION IS PLURAL—THE "FIRST CAUSE,"—DIFFICULTIES OF AND CONCERNING IT—MR. SPENCER QUOTES MR. MANSEL'S STATEMENT OF THE DIFFICULTIES AND CONTRADICTIONS OF TRANSCENDENTAL PHILOSOPHY WHEN IT CONSIDERS THE ABSOLUTE, THE INFINITE, THE FIRST CAUSE—INEXTRICABLE DILEMMA AND OPPOSITE CONTRADICTIONS ON ATTEMPTING TO "CONCEIVE" THE ABSOLUTE—MORAL CONTRADICTIONS, EXISTENCE OF EVIL, ETC.—HOW CAN THE INFINITE GIVE RISE TO THE FINITE, THE ABSOLUTE TO THE RELATIVE?—FURTHER STATEMENT OF "CONTRADICTIONS"—"THE IMPOSSIBILITY OF CONCEIVING THE CO-EXISTENCE OF THE INFINITE AND THE FINITE, AND THE COGNATE IMPOSSIBILITY OF CONCEIVING A FIRST COMMENCEMENT OF THE PHENOMENA, OR THE ABSOLUTE GIVING BIRTH TO THE RELATIVE, FOR THE INFINITE AS "INCONCEIVABLE" IS NECESSARILY SHOWN TO BE "NON-EXISTENT"—"A RELIGIOUS CREED IS A THEORY OF ORIGINAL CAUSATION"—RELIGIOUS BELIEF IN THE EXISTENCE OF AN "OMNIPOTENT SOMETHING WHICH PASSES COMPREHENSION"—"THAT THE POWER WHICH THE UNIVERSE MANIFESTS TO US IS UTTERLY INSCRUTABLE."

We have, as yet, made no progress in our search for God. and unless Mr. Spencer can give us some more satisfactory reasons in support of the truth of his great postulate than he has yet done, we shall be obliged to continue to reject that foolish "unknowable" which he so pertinaciously thrusts upon us.

A solution of the "problem of the universe" would, one would think, necessarily include an answer to the question—Is there God; and, does man come from God? But Mr.

Spencer says, "A critical examination, however, will prove, not only that no current hypothesis of the origin of the universe is tenable, but also that no tenable hypothesis can be framed"—which certainly seems to be true of Mr. Spencer's own hypothesis, at any rate.

Mr. Spencer (at page 30) says, "Respecting the origin of the universe, three verbally intelligible suppositions may be made. We may assert that it is self-existent; or that it is self-created; or that it is created by an external agency."

Previous to considering what Mr. Spencer says concerning the above suppositions as to the origin of the universe, I think it will be advisable to consider Mr. Spencer's statements respecting the *nature* of the universe. At page 36, he commences:—

"If from the 'origin' of the universe we turn to its 'nature,' the like insurmountable difficulties rise up before us on all sides—or rather, the same difficulties under new aspects. We find ourselves on the one hand obliged to make certain assumptions; and yet on the other hand we find these assumptions cannot be represented in thought.

"When we enquire what is the meaning of the various effects produced upon our senses,—when we ask how there come to be in our consciousness impressions of sounds, of colours, of tastes, and of those various attributes we ascribe to bodies;—we are compelled to regard them as the effects of some 'cause.' We may stop short in the belief that this cause is what we call 'matter,' or that matter is only a certain mode or manifestation of 'spirit' . . . or, regarding matter and spirit as proximate agencies, we may attribute all the changes wrought in our consciousness to immediate 'Divine power.' But be the cause we assign what it may, we are obliged to suppose *some cause*."

Here we have the initial—the fundamental erroneous assumption. Mr. Spencer says, "We are obliged to suppose '*some*' cause." It is not a *single* cause "we are obliged to suppose," but a "plurality" of *causes*. The effects being so

numerous and so different, we are compelled—unless some preconceived idea prevents us—we are compelled to suppose for these different effects, different causes. *Science*, as well as *religion*, *begins with "fetishism."* When the foot of a savage slips, and he falls and breaks his leg—when he sees some one tumble into a river, and drown—when he has a distracting toothache—when the scorching sun burns him—when a cutting wind chills him to the bone—when water turns into white stone—when the rain turns into snow—when huge quantities of stones and lava and fire and ashes rush "upwards" from the crater of a burning mountain—when a small drop of liquid expressed from a particular plant, when taken into his body causes in him the most horrible pains, and finally kills him—when in sleep he sees friends or enemies who have long been dead, whose ashes are still with him, and whose scalps still hang at his belt—when in his sleep these talk with him—laugh with him—drink with him—fight with him—when in the moaning of the wind he hears mysterious voices—boding success or defeat in battle—good or bad luck—when, in short, he is conscious of all the physical and mental phenomena by which he is surrounded, or which take place within him, and in which he lives—does he "suppose" some "cause"—some *one* cause for them? Let Fetishism—let Polytheism, answer. "Pantheism," "Theism," are names for the results of how many—and long-continued efforts—efforts hitherto unsuccessful—to consolidate the various causes which produce the infinite phenomena of which we have experience into a single unity. Has Mr. Spencer been more successful than the Theist? He proceeds (page 37), "And we are not only obliged to suppose *some* cause, but also a '*first*' cause. The matter, or spirit, or whatever we assume to be the agent producing in us these various impressions, must either be the first cause of them or not. If it is the first cause, the conclusion is reached. If it is not the first cause, then by implication there must be a cause behind it; which thus becomes

the real cause of the effect. Manifestly, however complicated the assumptions, the same conclusion must inevitably be reached. We cannot think at all about the impressions which the external world produces on us, without thinking of them as caused; and we cannot carry out an enquiry concerning their causation without inevitably committing ourselves to the hypothesis of a 'first' cause."

A "first cause" implies a "first effect." *The thing that requires "proving"* is, that there *was* a *"first" "effect"*—that is, some "real" "beginning;" which, Dr. Flint not being able to do his postulate that "Nature is but the name for an 'effect,' whose 'cause' is God," remained a mere assumption. As he could not "prove" any *"first" "effect,"* he could not prove any *"first" "cause."*

"But now if we go a step further and ask what is the 'nature' of this first cause, we are driven by an 'inexorable logic' to certain further conclusions. Is the first cause finite or infinite?

"If we say 'finite,' we involve ourselves in a dilemma. To think of the First Cause as finite, is to think of it as 'limited.' To think of it as limited, necessarily implies a conception of something 'beyond' its limits. It is absolutely impossible to conceive a thing as bounded without conceiving a region surrounding its boundaries. What, now, must we say of this 'region?' If the First Cause is limited, and there consequently lies something outside of it, this 'something' must have no First Cause — must be uncaused. *But if we admit that there can be 'something' 'uncaused,' there is no reason to assume a cause for anything.*"

Exactly. Until you have first proved that that for which you "assume" a "cause" really needs one—that is, that it is an effect—that is, *that it had a beginning,—"there is no reason to assume a cause for anything."* Dr. Flint's reasoning and the reasoning of Mr. Spencer about a First Cause, which Dr. Flint calls "Theos," and which Mr. Spencer calls "the Unknowable," are alike futile, because neither Dr. Flint nor

Mr. Spencer have shown us any instances of "creative causation," but only "changal causation," which needs neither "Theos" nor "unknowable" to account for it, but is sufficiently accounted for by the actions and reactions of those eternal powers of gravity, chemic attractions and repulsions, cohesity, polarity, elasticity. The question of "*First*," or "*creational causation*," cannot arise till we have been shown something which, having had a "beginning," cannot be accounted for otherwise than by "creation." Mr. Spencer says:—

"If, beyond that '*finite region*' over which the First Cause extends, there lies a '*region*' which we are compelled to regard as '*infinite*,' over which it does not extend—if we admit that there is *an infinite uncaused 'surrounding' the finite caused;* we tacitly abandon the hypothesis of causation altogether. Thus it is impossible to consider the First Cause as finite; and, if it cannot be finite, it must be Infinite."

This "logic" seems to be about as "inexorable" as that of the peepshow-man, who, being asked by a little spectator, who was somewhat doubtful about the individuality of two of the animals represented—"But which is the wolf and which is the lamb?" gave for answer—"Whichever you please, my little dear; you pays your money, and you takes your choice." We have "an *infinite* uncaused *surrounding* the *finite* caused;" whereas one has always understood that where the infinite was there could be nothing else; for if there were anything else, then the infinite could not *be* infinite, for it would be "limited" by the finite co-existing with it! No wonder Mr. Spencer discovers some more "insurmountable difficulties." If he considers the First Cause finite, then the region surrounding it cannot be infinite, and we have a finite First Cause and a surrounding Finite Region. If he considers the First Cause to be infinite, then there cannot be any "surrounding region." If Mr. Spencer chooses to suppose the First Cause to be "finite," yet to

be surrounded by a "region" which is "infinite," why then he can have as many "insurmountable difficulties" as he pleases.

"Another inference concerning the First Cause is equally unavoidable. It must be independent. If it is dependent it cannot be the First Cause, for that must be the First Cause on which it 'depends.' It is not enough to say that it is 'partially' independent; since this implies some necessity which determines its partial dependence; and this necessity, be it what it may, must be a higher cause, or the true First Cause, which is a contradiction. But to think of the First Cause as 'totally' independent, is to think of it as that which exists in the 'absence' of all other existence; seeing that if the 'presence' of any other existence is *necessary*, it must be partially 'dependent' on that other existence, and so cannot be the First Cause. Not only, however, must the First Cause be a form of being which has *no 'necessary'* relation to any other form of being, but it can have no necessary relation within itself. There can be nothing in it which determines change, and yet nothing which prevents change. For if it contains something which imposes such necessities or restraints, this 'something' must be a cause 'higher' than the First Cause, which is absurd. Thus the First Cause must be in every sense *perfect, complete, total, including within itself all power and transcending all law;* or, to use the established word, *it must be 'absolute.'*

"Here, then, respecting the nature of the universe, we seem committed to certain unavoidable conclusions. The objects and actions surrounding us, not less than the phenomena of our own consciousness, compel us to ask a cause; in our search for a cause we discover no resting-place until we arrive at the hypothesis of a First Cause, and we have no alternative but to regard this First Cause as Infinite and Absolute. These are inferences forced upon us by arguments from which there appears no escape. It is

hardly needful, however, to show those who have followed thus far how illusive are those reasonings and their results."

Not in the least. The illusive nature of the reasonings and their results is consequent upon the falseness of the premises on which the reasoning is founded. We need not *a* cause, but causes. *We need no First Cause because we have seen no First Effect.* When we are asked to believe in a Finite Region, being surrounded by a region which is infinite, it is not surprising that the conclusions reached should be "illusory," and should disclose "mutual contradictions."

Mr. Spencer's reasoning reminds one of the story of the Irish soldier, who, on bringing in two prisoners, was asked how he had managed to effect their capture, replied, "Faith, an' I 'surrounded' them, and tuk them one under 'aitch' elbow, as ye see."

Mr. Spencer says in the next sentence :—

"Instead, however, of repeating the 'disproof' used above, it will be desirable to pursue another method, showing the fallacy of these conclusions by disclosing their mutual contradictions."

Page 39.—"Here I cannot do better than avail myself of the 'demonstration' which Mr. Mansel, carrying out in detail the doctrine of Sir William Hamilton, has given in his 'Limits of Religious Thought.' And I gladly do this, not only because his mode of presentation cannot be improved, but also because, writing as he does, in defence of the current theology, his reasonings will be the more acceptable to the majority of readers."

"Having given preliminary definitions of the First Cause, of the Infinite and of the Absolute, Mr. Mansel says :—"

But in order that the reader may have all possible facilities for judging the portion of Mr. Mansel's work, quoted by Mr. Spencer, I think it advisable to give the "preliminary definitions of the First Cause of the Infinite, and of the Absolute," given by Mr. Mansel, but not quoted by Mr. Spencer. They occur at page 30 of Mr. Mansel's

work. It will be seen that Mr. Mansel is not like Mr. Spencer, considering the "*Nature of the universe*," but "how we are *to conceive the Deity as He is*." Mr. Mansel says:—

"There are three terms, familiar as household words in the vocabulary of philosophy, which must be taken into account in every system of metaphysical theology. *To conceive the Deity as He is*, we must conceive him as First Cause, as Absolute, and as Infinite. By the '*First Cause*' is meant that which produces all things, and is itself produced by none. By the '*Absolute*' is meant that which exists in and by itself, having no necessary relation to any other being. By the '*Infinite*' is meant that which is free from all possible limitation—that than which a greater is inconceivable, and which, consequently, can receive no additional attribute or mode of existence which it had not from all eternity."

I wish, if possible, to refrain from any criticism of Mr. Mansel's words till the quotation is finished, but I think a word must be said here. It seems to me that instead of defining the Infinite as that—"than which a greater is inconceivable," it would have been more correct to have said—that than which *no other is conceivable*;—for, to continue the quotation,—"The metaphysical representation of the Deity as Absolute and Infinite, must necessarily, as the profoundest metaphysicians have acknowledged, amount *to nothing less than the sum of all reality*. '*What kind of an Absolute Being is that*,' says Hégel, '*which does not contain in itself all that is actual, even evil included?*' We may repudiate the conclusion with indignation, but the reasoning is unassailable. If the Absolute and Infinite is an object of human conception at all, this, and none other, is the conception required. That which is conceived as absolute and infinite must be conceived as containing within itself the sum, not only of all actual, but of all possible modes of being. For if any actual mode can be denied of it, it is related to that mode, and

'limited' by it; and if any possible mode can be denied to it, it is capable of becoming more than it now is, and such a capability is a limitation. Indeed, it is obvious that the entire distinction between the possible and the actual can have no existence as regards the absolutely infinite; for an unrealised possibility is necessarily a relation and a limit. The scholastic saying, '*Deus est actus purus*,' ridiculed as it has been by modern critics, is, in truth, but the expression in technical language of the almost unanimous voice of philosophy in earlier and later times."

Mr. Spencer's quotation now commences (page 39) :—

"But these three conceptions—the Cause, the Absolute, the Infinite—all equally indispensable, do they not imply 'contradiction' to each other when viewed in conjunction as attributes of one and the same Being? A cause cannot, as such, be absolute; the absolute cannot, as such, be a cause. *The cause, as such, exists only in 'relation' to its effect;* the cause is a cause of the effect; the effect is the effect of a cause. On the other hand, the conception of the Absolute implies *a possible existence out of all 'relation.'* We attempt to escape from this apparent contradiction by introducing the idea of succession in time. The Absolute exists first by itself, and afterwards becomes a Cause. But here we are checked by the third conception, that of the Infinite. *How can the 'Infinite' 'become' that which it was not from the first?* If causation be a possible mode of existence, that which exists without causing is not infinite; that which becomes a cause has passed beyond its former limits. . . .

"Supposing the Absolute to 'become' a Cause, it will follow that it operates by means of free-will and consciousness. For a 'necessary' cause cannot be conceived as absolute and infinite. If necessitated by something beyond itself, it is thereby 'limited' by a superior power; and if necessitated by itself, it has in its own nature a necessary 'relation' to its effect. The act of causation must therefore

be voluntary; and volition is only possible in a conscious being. But consciousness, again, is only conceivable as a 'relation.' There must be a conscious subject, and an object of which he is conscious. 'The subject is a subject to the object; the object is an object to the subject;' and *neither can exist by itself as the 'absolute.'*"

Mr. Mansel here makes a great mistake. The object is indeed an object to the subject, for it is *made so* by the "subject" opposing itself to something else, which thus *becomes* the object—which it thus *makes to be an object to it.* But, unless the "object" be something capable of conceiving oppositions—and *does so*—the subject is *not* an object to the object, for the "object" does not conceive an "opposition." If the "object" opposes itself to the "subject," then what *was* the object *becomes* the "subject," and what *was* the subject *becomes* the "object" of that of which it was the object, but in consequence of opposing itself to the other—is now the subject. *I* can oppose a "stone" to myself, which is thus an "object" to me. But the stone cannot oppose *itself* to me, so cannot become a "subject" of which "I" am the "object."

To continue the quotation:—

"This difficulty, again, may be for the moment evaded by distinguishing between the absolute as related to another, and the absolute as related to itself. The absolute, it may be said, may possibly be conscious, provided it is only conscious of itself. But this alternative is, in ultimate analysis, no less self-destructive than the other. For the object of consciousness, whether a mode of the subject's existence or not, is either created in and by the act of consciousness, or has an existence independent of it. In the former case, the object depends upon the subject, and the subject alone is the true absolute. In the latter case, the subject depends upon the object, and the object alone is the true absolute. Or, if we attempt a third hypothesis, and maintain that each exists independently of the other, we have no absolute at all, but

only '*a pair of relatives*;' [exactly!] for co-existence, whether in consciousness or not, is itself a relation.

"The corollary from this reasoning is obvious. Not only is the absolute, as conceived, incapable of a *necessary* relation to anything else; but it is incapable of containing, by the constitution of its own nature, an essential relation within itself; as a whole, for instance, composed of parts, or as a substance consisting of attributes, or as a conscious subject in *antithesis* to an object. For if there is in the absolute any principle of unity, distinct from the mere accumulation of parts or attributes, this principle alone is the true absolute. If, on the other hand, there is no such principle, then there is no absolute at all, *but only a plurality of relatives*. The almost unanimous voice of philosophy, in pronouncing that the absolute is both one and simple, must be accepted as the voice of reason also, so far as reason has any voice in the matter. But this absolute unity, as indifferent and containing no attributes, can neither be distinguished from the multiplicity of finite beings by any characteristic feature, nor be identified with them in their multiplicity. Thus we are landed in an inextricable dilemma. The absolute cannot be conceived as 'conscious,' neither can it be conceived as 'unconscious;' it cannot be conceived as 'complex,' neither can it be conceived as 'simple;' it cannot be conceived by 'difference,' neither can it be conceived by the 'absence of difference;' it cannot be 'identified' with the universe, neither can it be 'distinguished' from it. The 'one' and the 'many,' regarded as the beginning of existence, are thus alike 'incomprehensible.'

"The fundamental conceptions of Rational Theology being thus *self-destructive*, we may naturally expect to find the same antagonism manifested in their special applications. . . . How, for example, can Infinite Power be able to do all things, and yet Infinite Goodness be able to do evil? How can Infinite Justice exact the utmost penalty for every sin, and yet Infinite Mercy pardon the sinner? How can Infinite Wisdom know all that is to come, and yet Infinite

Freedom be at liberty to do or to forbear? *How is the existence of Evil compatible with that of an infinitely Perfect Being; for if he wills it, he is not infinitely good; and if he wills it not, his will is thwarted and his sphere of action limited?*

"Let us, however, suppose for an instant that these difficulties are surmounted, and the existence of the Absolute securely established on the testimony of reason. Still we have not succeeded in reconciling this idea with that of Cause; *we have done nothing towards explaining how the 'absolute' can give rise to the 'relative,' the 'infinite' to the 'finite.'* If the condition of causal activity is a higher state than that of quiescence, the absolute—whether acting voluntarily or involuntarily—has passed from a state of comparative imperfection to one of comparative perfection; and therefore was not originally perfect. If the state of activity is an inferior state to that of quiescence, the absolute, in becoming a cause, has lost its original perfection. There remains only the supposition that the two states are equal, and the act of creation one of complete indifference. But this supposition annihilates the unity of the absolute, or it annihilates itself. If the act of creation is real, and yet indifferent, we must admit the possibility of two conceptions of the absolute, the one as productive, the other as non-productive. If the act is not real, the supposition vanishes. . . .

"Again, *how can the 'relative' be conceived as coming into being?* If it is a distinct reality from the absolute, it must be conceived as passing from non-existence into existence. But to conceive an object as non-existent is again a self-contradiction; for that which is conceived exists, as an object of thought, in and by that conception. We may abstain from thinking of an object at all; but if we think of it, we cannot but think of it as existing. It is possible at one time not to think of an object at all, and at another to think of it as already in being; but to think of it in the 'act' of 'becoming,' in the 'progress' from not being into

being, is to think that which, in the very thought, annihilates itself. . . .

"To sum up briefly this portion of my argument: The conception of the Absolute and Infinite, from whatever side we view it, appears encompassed with contradictions. There is a contradiction in supposing such an object to 'exist,' whether alone or in conjunction with others; and there is a contradiction in supposing it 'not to exist.' There is a contradiction in conceiving it as 'one;' and there is a contradiction in conceiving it as 'many.' There is a contradiction in conceiving it as 'personal,' and there is a contradiction in conceiving it as 'impersonal.' It cannot, without contradiction, be represented as 'active;' nor, without equal contradiction, be represented as 'inactive.' It cannot be conceived as the 'sum of all existence,' nor yet can it be conceived as a 'part' of that sum."

Mr. Spencer's quotation ends here. I add the following from Mr. Mansel (page 35):—

"The whole of this web of contradictions (and it might be extended, if necessary, to a far greater length) is woven from one original warp and woof, namely—*the impossibility of conceiving the 'co-existence' of the 'infinite' and the 'finite,' and the cognate impossibility of conceiving a 'first' commencement of 'phenomena,' or the 'absolute' giving 'birth' to the 'relative.'*"

And at page 38:—

"*For the infinite, as 'inconceivable,' is necessarily shown to be 'non-existent.'*"

"And now," asks Mr. Spencer (page 45), "What is the bearing of these results on the question before us? . . .

"Leaving out the accompanying moral code, which is in all cases a supplementary growth, *a religious creed is definable as a theory of original causation.*"

Page 44.—"Religious creeds diametrically opposed in their overt dogmas are yet perfectly at one in the tacit conviction that the existence of the world, and all it contains, and all which surrounds it, is a mystery ever pressing for

interpretation. On this point, if on no other, there is entire unanimity."

Page 45.—"Not only is the omnipresence of something which passes comprehension that most abstract belief which is common to all religions . . . but it is that belief which the most unsparing criticism of each leaves unquestionable, or rather, makes ever clearer."

Page 46.—"The analysis of every possible hypothesis proves, not simply that no hypothesis is sufficient, but *that no hypothesis is even thinkable.* And thus the mystery which all religions recognise turns out to be a far more transcendent mystery than any of them suspect—not a 'relative,' but an 'absolute' mystery. . . .

"If religion and science are to be reconciled, the basis of reconciliation must be this deepest, widest, and most certain of all facts—*That the power which the universe manifests to us is utterly inscrutable.*" (?)

CHAPTER XII.

MR. SPENCER'S "SOLUTION" OF THE PROBLEM OF THE EXISTENCE OF THE ABSOLUTE.

THE FINAL QUESTION; "WHAT MUST WE SAY CONCERNING THAT WHICH TRANSCENDS KNOWLEDGE?" MUST WE BELIEVE "ONLY" IN THE RELATIVE, OR ALSO IN SOMETHING "BEYOND" THE RELATIVE? CONSIDERS DIFFICULTIES IN THE WAY OF THE LATTER, AS STATED BY MR. MANSEL AND SIR WILLIAM HAMILTON—OBJECTIONS; "A QUALIFICATION WHICH SAVES US FROM SCEPTICISM—OBJECTIONS; MR. SPENCER CONFOUNDS "UNKNOWABLE" WITH "INCONCEIVABLE"—"TOLLIPOLLIBOD"—MR. SPENCER'S SOLUTION—OBJECTIONS.

ONE would have imagined that such a result would have led to the conclusion that further consideration of such a hopeless subject must be futile; nevertheless, at page 87, Mr. Spencer, after having affirmed the "Relativity of all Knowledge," and after all he has himself advanced, and all he has "approvingly quoted" from Mr. Mansel on the "inconceivability" of the "First Cause" of the "Absolute," of the "Infinite," Mr. Spencer says:—"There still remains the final question—What must we say concerning that which transcends knowledge? Are we to rest wholly in the consciousness of phenomena? Is the result of enquiry to exclude utterly from our minds everything but the 'relative?' or must we also believe in something 'beyond' the 'relative?'

"The answer of pure logic is held to be, that by the limits of our intelligence we are rigorously confined within the 'relative;' and that anything transcending the relative can be thought only as a pure negation, or as a non-existence. 'The *absolute* is 'conceived' merely by a

negation of conceivability,' writes Sir William Hamilton. [Which seems to me to be pure nonsense.]

"'The *Absolute* and the *Infinite*,' says Mr. Mansel, 'are thus, like the *Inconceivable* and the *Imperceptible*, names indicating, *not an object of thought or of consciousness at all*, but the *mere absence* of the conditions under which consciousness is possible.' From each of which extracts may be deduced the conclusion, that since reason cannot warrant us in affirming the *positive* existence of that which is cognisable only as a '*negative*,' we cannot rationally affirm the '*positive*' *existence of anything beyond phenomena*."

"*Positive* existence of what is *cognisable* only as a *negative!*" Is there any existence whatever that is *not* "positive?" There is no such thing as "negative existence." A negation is an affirmation of non-existence. Can *non*-existence be "cognised?" How *can* the non-existent be cognised or known? Mr. Spencer continues:—

"Unavoidable as this conclusion seems, it involves, I think, a grave error. . . . Though, on the foregoing pages, the arguments used by these writers to show that the *Absolute is unknowable* have been 'approvingly quoted,' and though these arguments have been enforced by others equally thoroughgoing, yet there remains to be stated a *qualification* which saves us from that scepticism otherwise necessitated."

It is a pity—though it may be useful to him—that Mr. Spencer should allow himself to make statements so incorrect. He speaks of "arguments" used by these writers—Sir W. Hamilton and Mr. Mansel—to show that the absolute is "*unknowable;*" when, in fact, they were "used" to show, not that the absolute was "*unknowable*," but that the word stood for *nothing conceivable*. "For"—as Mr. Mansel says (page 38 of his book)—"For the '*Infinite*,' *as* '*inconceivable*,' *is necessarily shown to be* '*non-existent*.'" Mr. Spencer's words distinctly and directly imply that the absolute "*exists*," though it is "*unknowable*." It is easy to invent words which shall not be names of any existence. Shall I say that "Tollipolli-

bod" is "unknowable," but that it nevertheless exists? But let us hear what that "qualification" is which is "to "save" us from "scepticism."

Page 88.—"Besides that definite consciousness of which Logic formulates the laws"—

Let the reader please bear in mind that though Mr. Spencer speaks of "consciousness" as if there were only one kind of consciousness, there are two—"consciousness" of "sensations" and consciousness of "thoughts;" but Logic does not formulate the laws of sensation, for in it the mind is passive. It only formulates, not the "*laws*" of thought, but the rational connections and sequences, and the relations of thoughts to each other. But Logic has nothing to do with sensations.

"Besides," continues Mr. Spencer, "that *definite* consciousness [of thoughts] of which Logic formulates the laws, there is also an *indefinite* consciousness which cannot be formulated. Besides complete thoughts, and besides the thoughts which though incomplete admit of completion"—

There are no such things, there cannot be "half" a thought, for it is not a thought unless it is an opposition—and "one" cannot constitute an "opposition."

"There are thoughts which it is impossible to complete, and yet which are still real, in the sense that they are normal affections of the intellect."

"Thoughts" are *acts* of the "*Ego*," not *affections* of it, as "sensations" are.

Mr. Spencer might as well speak of a sheet of paper with only one side, and of which it was heartrending to think it could never have its other side.

"Observe," says Mr. Spencer, "in the first place, that every one of the arguments by which the relativity of our knowledge is demonstrated distinctly postulates the positive existence of something beyond the relative."

"*The*" Relative has no real, only an abstract existence. Just as there is no "*the*" good, or "*the*" true, or "*the*"

beautiful; there are things which are good, true, beautiful, etc., etc. They are but names of thoughts about things, not of things. *The* Relative is a name indicating all the relations of which we have knowledge; but just as there is no "*thing*" "good," so there is no "*thing*" Relative, but only 'relations' between things and between thoughts;—"*observed*," relations of difference between things; "conceived," relations of opposition, which *constitute* thoughts. Mr. Spencer cannot be allowed to speak of *the* relative, but "relations." Let us rather say—That every one of the arguments by which the relativity (a quality) of our knowledge is demonstrated, distinctly postulates the positive existence of something "beyond" any particular relation—that is, that everything of which we have knowledge is bounded by other "somethings," which, of course, must have "relations" with such things as they limit, and by which they are themselves limited. Mr. Spencer continues:—

"To say that we cannot *know* the Absolute is, by implication, to affirm that there *is* [Mr. Spencer's italics] an Absolute. In the very denial of our power to learn *what* [Mr. Spencer's italics] the Absolute is, there lies hidden the 'assumption' [!] *that* [Mr. Spencer's italics] it is; and the making of this '*assumption*' '*proves*' [!] that the Absolute has been present to the mind, not as a *nothing* [!], but as a something."

To say that an "*assumption*" can "*prove*" anything is rather curious reasoning, and is it as possible to have a "nothing" in our minds as to have a "something?"

But the assertion was not that we cannot *know* the Absolute, but that the *word* Absolute was not the name of *any* "conception" *whatever*—any more than "Tollipollibod"—that it was non-existent; and that, consequently, Mr. Spencer's reasoning, not being founded upon anything at all, not even upon "a nothing," is absolutely—or entirely—or unmixedly—or purely—futile; and, I think, renders any further consideration of Mr. Spencer's affirmation unnecessary. Never-

theless, I will notice one or two out of the long series of statements which Mr. Spencer advances in support of his belief, that though we cannot know "*what*" the Absolute "*is*," we still have an "indefinite consciousness" "*that*" it is—*not* as a "nothing," but as a "something;" whereas the Absolute, if it is to be conceived at all, must be conceived as—language,—that is, conception—fails us; must be conceived as a something—besides which, there is—nothing! Mr. Spencer continues:—

"The 'Noumenon,' everywhere named as the antithesis of the 'Phenomenon,' is throughout necessarily thought of as an actuality."

The "Noumenon"—*the* "Phenomenon"—*which* Noumenon? *which* Phenomenon?

"It is rigorously impossible to conceive that our knowledge is a knowledge of 'appearances' only, without at the same time conceiving a "Reality" of which they are appearances, for appearance without reality is unthinkable."

I must confess that I experience a strong feeling of impatience while I write down many of Mr. Spencer's statements. He has no right to speak of "appearances," and then to oppose to that plural only a singular—"Reality." "Appearances," to be accounted for, require to account for them, not *a* "Reality," but "causes;" and to think of appearances "appearing" without causes, is the real "unthinkable." Mr. Spencer speaks as if "appearances"—"phenomena"—were not equally as "real" as the "noumena," which are their causes. A little further on he repeats in another form his previous statement—that is, "to say we cannot 'know' the Absolute is, by implication, to affirm that there *is* an Absolute," etc.

"Clearly, then, the very demonstration that a *definite* consciousness of the Absolute is impossible to us unavoidably presupposes an *indefinite* consciousness of it."

But, as I said above, as *the Absolute is a word, a sound only, and stands for no conception whatever*—any more than

"Tollipollibod" does—how can we have *any* consciousness of "non-existence" or "nothing"—either "definite" or "indefinite?"

At the same time I would guard against misconstruction. Absolute *is* the opposite of Relative; but it is not a thing, but a quality; not a noun, but an adjective. Or rather, an adverb—an adverb being an adjective which is positive only.

I examine certain samples—say of water. Their state ranges from extreme foulness to "absolute" purity. Comparing the worst specimen with another which stands about midway between the worst and the best, I might say—"Well, as waters go, I may call it pretty fair, what many would call 'pure,' but it is far from what it ought to be if it is to be drunk by human beings. But here, now"—taking up the perfectly pure sample—"here is a sample whose purity is 'absolute.' Now, that one you hold in your hand is, as compared with the worst sample, 'relatively' pure, but not like this one—'absolutely' pure; for this one contains no other element than goes to the constitution of water."

At page 90, Mr. Spencer continues:—

"We are conscious of the Relative, as existence under conditions and limits."

One can scarcely quote a line from Mr. Spencer without meeting inadmissible words or statements. "Existence"—existence is an abstract ultimate. Everything that exists, exists. But everything is not the same thing. There are seventy elemental existences. There are all the powers, all the forces which are the actions of those powers. There is space, there are *Egos*, thoughts, feelings, imaginations, hopes, fears, etc., etc.—an endless series of signs of "other things." There is no end to them. There is no "nothing" anywhere. "Existence" is a name common to all things—wood, stone, man, air, water—space. We are conscious, not of *the* Relative as Existence, but we are conscious of *Relations between existences*—relations of difference—relations of limiting one another—of conditioning one another.

"It is impossible that these 'conditions' and 'limits' can be thought of apart from something to which they give the 'form;' the abstraction of these 'conditions and limits,' is, by the hypothesis, the abstraction of them *only*. Consequently there must be a *residuary consciousness of something which filled up their outlines; and this indefinite something constitutes our consciousness of the Non-relative or Absolute.* Impossible though it is to give to this consciousness any qualitative or quantitative expression whatever, it is not the less certain that it remains with us a positive and indestructible element of—[of what on earth do you suppose?]—of thought [!]"

I will try to put this in a form which may be "understanded." "Existence," is an abstract term for the "sum of existence," composed, as I have said above, of what we may call bits or finites occupying space. Let us suppose each bit to be at such a distance from every other bit that no power possessed by any bit could act upon any other bit. In order to realise this state of things we must, for the moment, suspend gravity, or else place each bit at such an extreme distance that gravity shall be practically nil. No bit would then "condition" or "limit" any other bit. But each bit has a "form," and we have to get rid of that "form." But what *is* that "form?" Is it a kind of skin or shell like that of an orange, or the "skin" of a drop of water, or the shell of a nut? We will remove that skin or shell. We do so, but we take nothing by our motion. The confounded (and confounding) "bit" still has a "form." Somehow it has got another skin or shell. We repeat the operation—repeat it again—but with the same results. And please to observe that we get an awful accumulation of these shell or skin-"forms,"—which I am afraid will be very much in the way of this "Absolute" of which we are to be "indefinitely" conscious. At last we ask ourselves, Form—form—What *is* Form? And we at once perceive there is no such *thing* as "form." The "form" of a thing is not itself a thing, and

which can be separated from the thing of which it is the form. Form is simply a "*name*" for the limits, in all directions, of a body. And hence we are able to understand that a "Force" has a form as well as a "body"—as electricity, etc. The consequence is that what we call Form, not being a *thing*, cannot be got rid of, for one must *have* a thing before one can get rid of it; and the something that Mr. Spencer supposes "filled up the *outlines*, or skin or shell, of that which gave them form," remains exactly as it was.

It is easy to see why Mr. Spencer uses the abstract singular word "existence," instead of the plural, "existences," for, supposing him to have got rid of all the "conditions" and all the "limits"—the skins, the shells—given by "forms," he seems to think there would remain the "existence,"—*without* either limits or conditions, or forms, or shells, or skins—which is supposed to constitute the Absolute, and of which we may be supposed to have an "indefinite" consciousness. But unfortunately, even if we *could* place the "bits" so far off that they would not "limit" or "condition" each other—if we *could* get rid of the "forms" of the "bits," the bits, even if destitute of "forms," would still be *different kinds of "bits;"* would be, not *an* existence pure and simple such as might befit a respectable Absolute, but an indefinite number of different kinds of bits in unlimited space, and having no relation whatever to "*thought*," but only to *things*.

Mr. Spencer solves none of the problems of "the Absolute." His "Absolute" is an indefinite number of different kinds of finites existing in space, and together with space constituting Infinity—not the Infinite.

His "*Ultimate of Ultimates*," his *Persistent and Indestructible Force*, is the only thing which does *not* persist, it is the only thing which *is* destructible. His "Absolute Force" is composed not of "Force" at all, but is the result of the *action* of those indestructible "*powers*" called gravity, chemical attractions and repulsions, cohesity, polarity, and

elasticity, and possibly magneticity, which together do not constitute an Unknowable, but a number of Powers known to us by the effects they produce.

As we have reached no Absolute, as the powers are not singular but plural, and exist in space, Mr. Spencer's attempt to "unify" all knowledge cannot be said to have been, as yet, very successful.

CHAPTER XIII.

MR. SPENCER'S THREE "VERBALLY INTELLIGIBLE" SUPPOSITIONS RESPECTING THE "ORIGIN" OF THE UNIVERSE—"THAT IT IS SELF-EXISTENT;" "THAT IT IS SELF-CREATED;" "THAT IT IS CREATED BY AN EXTERNAL AGENCY."

THAT IT IS CREATED BY AN EXTERNAL AGENCY—MR. SPENCER'S OBJECTIONS—THAT IT IS "SELF-CREATED;" WHICH MR. SPENCER SAYS, "PRACTICALLY AMOUNTS TO PANTHEISM"—OBJECTIONS—DEFINITIONS OF PANTHEISM—MR. SPENCER'S DOCTRINE—MR. SPENCER'S FIRST "VERBALLY INTELLIGIBLE SUPPOSITION"—"THAT THE UNIVERSE IS SELF-EXISTENT"—ASSERTS THE IMPOSSIBILITY OF SUPPOSING SELF-EXISTENCE—OBJECTIONS—MR. SPENCER CONFUTES HIMSELF—OBJECTIONS TO "PANTHEISM"—OBJECTIONS TO CREATION BY EXTERNAL AGENCY—SO FAR, THE ONLY OUTCOME IS "PAN-ISM," OR "NATURISM," SO WE MUST INTERROGATE NATURE—MUST ASK IT HOW IT ACCOUNTS FOR MAN.

BEFORE returning to the "*Problem*" of the "*Origin of the Universe*," I did intend to have given some consideration to what Mr. Spencer calls "symbolical conceptions," but I think enough has already been said respecting Mr. Spencer's conception of "conceptions" to render it unnecessary.

"Respecting the Problem of the Universe, Mr. Spencer affirms (page 30), "That a critical examination will prove, not only that no current hypothesis is tenable, but also that no tenable hypothesis can be framed.

"Respecting the *Origin* of the Universe, three verbally intelligible suppositions may be made. We may assert that it is *self-existent*, or that it is *self-created*, or that it is *created* by an *external* agency."

We will consider the last "supposition" first;—that "the universe is created by an external agency."

Mr. Spencer (page 33) first refers to the crude opinion that the universe was made by a "Great Artificer," much as a workman shapes a piece of furniture. But such a supposition leaves the existence of the materials so shaped unaccounted for. The workman merely combines and shapes materials already existing. But whence the pre-existing elements? "The production of matter out of nothing is the real mystery. Still more manifest does the insufficiency of this theory of creation become, when we turn from material objects to that which contains them—when, instead of matter, we contemplate 'space.' Did there exist nothing but an immeasurable void, explanation would be needed as much as now. There would still arise the question—how came it so? If the theory of creation by external agency were an adequate one, it would supply an answer, and its answer would be—space was made in the same way that matter was made. But the impossibility of conceiving this is so manifest, that no one dares assert it. For if space was created, it must have been previously non-existent. *The 'non-existence' of space cannot, however, by any effort be imagined.* It is one of the most familiar truths that the idea of space surrounding us on all sides is not for a moment to be got rid of—*not only are we compelled to think of space as now everywhere present, but we are 'unable' to conceive its absence either in the past or in the future.* And if the 'non-existence' of space is absolutely inconceivable,' then, necessarily, its 'creation' is absolutely 'inconceivable.' Lastly, even supposing that the genesis of the universe could really be represented in thought as the result of an external agency, the mystery would be as great as ever, for there would still arise the question—how came there to be an external agency? To account for this, only the same three hypotheses are possible—self-existence, self-creation, and creation by external agency. Of these, the last is useless; it commits us to an infinite series of such agencies, and even then leaves us where we were. By the

second we are practically involved in the same predicament, since, as already shown, 'self-creation' [which Mr. Spencer identifies with "Pantheism"] implies an infinite series of potential existences. We are obliged, therefore, to fall back upon the first [Atheism or "self-existence"], which is the one commonly accepted and commonly supposed to be satisfactory. Those who cannot conceive a self-existent *universe*, and who, therefore, assume a 'Creator' as the source of the universe, take for granted that they *can* conceive a 'self-existent' *Creator*. The mystery which they recognise in this great fact surrounding them on every side they transfer to an alleged 'source' of this great fact, and then suppose that they have solved the mystery. But they delude themselves. As was proved at the outset of the argument, 'self-existence' is rigorously 'inconceivable,' and this holds true *'whatever' be the nature of the object of which it is predicted.* Whoever agrees that the Atheistic hypothesis is untenable because it involves *the impossible idea of self-existence,* must perforce admit that the Theistic hypothesis is untenable if it contains the same impossible idea."

"The hypothesis of *self-creation*, which practically amounts to what is called *'Pantheism,'* is similarly incapable of being represented in thought" (page 32).

Mr. Spencer is certainly a most extraordinary writer.

To say that pickled pork practically amounts to blocks of granite, would not be further from the truth than to say that "the hypothesis of self-creation practically amounts to what is called Pantheism." Pope says, "True, no meaning puzzles more than wit." Did any human creature, capable of understanding the meaning of the words "self-creation," ever suppose that a thing could "create" "itself?" Mr. Spencer speaks of the "impossibility"—how many manufactured "impossibilities" has Mr. Spencer presented to us?—speaks of the "impossibility of expanding our symbolic conception of self-creation into a real conception." I venture to affirm that no one ever had any conception whatever

of self-creation, symbolic or otherwise. To speak of "self-creation" is simply an absurdity, and to say that the hypothesis of self-creation "practically amounts to what is called *Pantheism*," must be placed in the same category. That any one should assert that "self-creation"—which is nonsense, and which is absolutely inconceivable—is "practically the same" as a religion which is held by a larger number of human beings than any other belief whatsoever, might also be supposed to be "inconceivable;" nevertheless, Mr. Spencer makes that assertion.

What is that religious and philosophical doctrine called Pantheism?

The definition given in "Ogilvie's Imperial Dictionary" (latest edition, 1882), is:—

"Pantheism, n. (Greek, *pan*, all; and *Theos*, God; whence *Theism*.)

"The doctrine—that the universe, taken or conceived of as a whole, is God, or the 'system' of the Theology—in which it is maintained, that the universe, man included, is God, or simply modes or '*manifestations*' of God."

From "Gardner's Faiths of the World: a Dictionary of Religions and Religious Sects" (2 vols., imperial octavo, pages 992 and 930):—

"That God is the soul of the universe, the *one and only true existence*. The Infinite element into which all being ultimately resolves itself. . . . It had its origin at a very remote period in the East, and forms, in fact the groundwork of, the entire system of the Vedanta school of philosophy, which proceeds upon the fundamental maxim, '*Brahm alone exists; all else is illusion.*' . . . It denies true existence to any other than the one Absolute Independent Being. It declares that what is usually called matter can have no distinct separate or independent essence, but is only an emanation from, and a '*manifestation*' of, the one sole-existing spiritual essence—Brahm" (vol. ii. page 594).

"Bruno, in the sixteenth century, lays down the principle —that all things are absolutely identical, and that the infinite and the finite, spirit and matter, are nothing more than different 'modifications' of the one universal Being. The world, according to this system, is simply the 'unity' manifesting itself under the conditions of 'number.' Taken in itself, the Unity is God; considered as producing itself in number, it is the world" (Gardner, vol. xi., page 594).

"Spinoza.—One Infinite substance of which every thing besides is simply a mode or '*manifestation*.' . . . Only one 'Absolute' Being 'manifesting' itself in a variety of forms" (page 594).

"Cousin—declares God to be—'Absolute cause, one and many, eternity and time, essence and life, end and middle, at the summit of existence, and at its base, infinite and finite together; in a word a Trinity, being at the same time God, Nature, and Humanity'" (vol. ii., page 595).

Mr. Spencer ("First Principles," page 154) says:—

"The foregoing analysis was commenced in the belief that the proposition, postulated by philosophy, must affirm some ultimate classes of likenesses and unlikenesses, in which all other classes merge, and here we have found that all "*manifestations*" of the Unknowable are divisible into two such classes. What is the division equivalent to?

"Obviously, it corresponds to the division between *object* and *subject*. This profoundest of distinctions among the 'manifestations' of the Unknowable, we recognise by grouping them into self and not-self. These 'faint' 'manifestations' forming a continuous whole differing from the other in the quantity, quality, cohesion, and conditions, and existence of its parts, we call the *Ego;* and these 'vivid' 'manifestations,' indissolubly bound together in relatively immense masses, and having independent conditions of existence, we call the *non-Ego.* Or rather, more truly, each order of 'manifestations' carries with it the irresistible implication of *some power that manifests itself;*

and by the words *Ego* and *non-Ego*, respectively, we mean the 'power' that manifests itself in the faint forms, and the 'power' that manifests itself in the vivid forms."

All things, then, are "*manifestations of an unknowable power.*" *Subject and object, self and not-self*, are only "*distinctions*" among those manifestations.

At page 169, Mr. Spencer says:—

"We come down then finally to *Force* as the *Ultimate of Ultimates.*"

At page 192d, at the close of the chapter on the "Persistence of Force," Mr. Spencer says: —

". . . The force of which we assert persistence, is that *Absolute Force* of which we are indefinitely conscious as the necessary correlate of the force we know. By the Persistence of Force we really mean the persistence of some Cause which transcends our knowledge and conception. In asserting it, we assert *an Unconditioned Reality without beginning or end.*"

So that we may say that Mr. Spencer postulates an "Absolute," Unconditioned, Eternal, Unknowable Force or Cause; of which all phenomena, whether *called subject* or *object*, *Ego* or *non-Ego*, are nothing more than "manifestations," which is—Pantheism. For the words "Brahm," or "Pan"—"Theos," we have only to substitute the "Unknowable," and the "Vedanta" definition of Pantheism is identical with Mr. Spencer's statement — that the "Unknowable [instead of Brahm, or Pan—Theos] is the soul of the universe—the only true Existence—the Infinite Element into which all being ultimately resolves itself."

It is unfortunate for Mr. Spencer that he should have said of the hypothesis of "self-creation," that it is *incapable of being represented in thought*, and that it practically amounts to *Pantheism*—seeing that "practically" "Pantheism" is his *own doctrine*. It reminds one of the story of that swearing Prince-Bishop who was reproved by a scandalised peasant for using profane language.—And he

a Bishop! "Sir," said the Bishop, "I swear—not as a Bishop, but as a Prince." "Ah!" said the peasant, "that's all very well; but when the Prince goes to the Devil for swearing, what will become of the Bishop?"

We have now "advanced backwards" till we have come to the first of Mr. Spencer's "three verbally intelligible" suppositions respecting the origin of the universe. "We may assert that it is *self-existent*." At page 31, Mr. Spencer says:—

"In the first place, it is clear that by self-existence we especially mean an existence independent of any other—not produced by any other.

"The assertion of self-existence is simply an indirect denial of creation. In thus excluding the idea of any antecedent cause, we necessarily exclude the idea of a beginning; for to admit the idea of a beginning—to admit that there was a time when the existence had not commenced—is to admit that its commencement was determined by something, or was caused, which is a contradiction. Self-existence, therefore, necessarily means *existence without a beginning; and to form a conception of self-existence is to form a conception of existence without a beginning. Now by no mental effort can we do this.* To conceive an existence through infinite past time implies the conception of infinite past time, which is an impossibility."

To dispose of Mr. Spencer's assertion respecting the impossibility of conceiving infinite past time is very easy. I have, I hope, already shown that "time" is not an entity—a thing, but merely a name indicating our "thought" of the continuous duration or existence of any thing or combination of things, or sensations, or thoughts. If there were no existence there could be no "time." Water, for instance, exists in the state of ice. Suppose the ice to be melted back into water after having being in the state of ice for half-an-hour. We should name our cognisance of its continued existence in the state of ice as "half-an-hour."

Time being a name for continuing existence, and it being impossible for us to imagine absence of ALL *existence, it is impossible for us to imagine absence of time, which is merely repeating the previous phrase in a different form.*

Mr. Spencer says, "By no mental effort" can we form a conception of existence without a beginning—that is "self-existence."

A beginning of anything is either a matter of experience or of unavoidable inference. All our experiences of space and matter fail to show any beginning of either. We can imagine that there might be a beginning of the existence of matter, but we cannot by "any mental effort" imagine a "beginning" of the existence of space, so are *compelled to think it as self-existent.* Speaking of the existence of space, while considering "creation by external agency" (page 34), Mr. Spencer says:—

"When, instead of matter, we contemplate space, did there exist nothing but an immeasurable void, explanation would be needed as much as now. There would still arise the question—how came it so? If the theory of creation by external agency were an adequate on, it would supply an answer, and its answer would be—space was made in the same manner that matter was made. But the impossibility of conceiving this is so manifest, that no one dares to assert it. For if space was created it must have been previously non-existent. *The non-existence of space cannot, however, by any 'mental effort' be imagined.* It is one of the most familiar truths, that the idea of space surrounding us on all sides *is not for a moment to be got rid of*—not only are we compelled to think of space as now everywhere present, but *we are unable to conceive its absence either in the past or in the future.* And if the non-existence of space is absolutely inconceivable, then, necessarily its creation is absolutely inconceivable."

Then, the "non-existence of space—either in the past or in the future—being absolutely inconceivable, and neces-

sarily its creation is absolutely inconceivable"—we are "compelled" to conceive it as—"*self-existent*" and "*external*." But what becomes of Mr. Spencer's previous assertion that to "conceive self-existence through infinite past time is an impossibility?" I have generally had myself to show that Mr. Spencer's "impossibilities" are anything but "impossible," but in this particular case, Mr. Spencer kindly saves me the trouble, and confutes himself.

Mr. Spencer proceeds (page 31):—

"Even were self-existence conceivable, it would not in any sense be an explanation of the universe. No one will say that the existence of an object at the present moment is made easier to understand by the discovery that it existed an hour ago, or a day ago, or a year ago; . . . then no accumulation of such finite periods, even could we extend them to an infinite period, would make it more comprehensible. Thus the 'Atheistic theory' [that things are self-existent, and consequently need no Creator] is not only absolutely 'unthinkable,' but, even if it were thinkable, would not be a solution. The assertion that the universe is 'self-existent' does not really carry us a step beyond the cognition of its present existence; and so leaves us with a mere re-statement of the mystery."

We have seen that of the "three verbally intelligible suppositions respecting the origin of the universe," the supposition of "self-creation" is inconceivable, and was never entertained by any one capable of understanding what self-creation implies—that before a thing could exist, it must exist, and afterwards cause itself to exist.

We have no reason to think creation of atoms by a Being *possessing the requisite ability* is unbelievable; but as there is a total absence of evidence of any such creation, or of the existence of any Being possessed of the requisite ability, we cannot credit the assertions of those who affirm that such a Being exists, and has exercised the power attributed to him.

We are obliged to reject the Pantheistic theory, because it asserts the existence of a single absolute entity, of whose action all phenomena are, without any exception, the manifestations; but of whose existence it cannot give any proof whatever.

Mr. Spencer's interpretation of the Pantheistic idea is that of "an absolute, but unknowable Force . . . an unconditioned Reality *without beginning or end*," *of which all phenomena are the manifestations.*

We have, I hope, seen that Mr. Spencer has failed to establish the existence of anything "absolute," and that what he calls "persistent and indestructible Force" really consists of different and indestructible Powers, to which we give the names, respectively, of gravity, chemic attractions, chemic repulsions, cohesity, polarity, elasticity, and possibly magneticity. That these powers, variously combined, constitute the seventy different kinds of atoms, of which we have experience. That force is the "action" of these different powers, and is destructible by equal quantities of opposing force; but the Powers, which constitute the atom, are indestructible—though some of them are transparent to others, and allow their passage. Such, being supposed correct—it follows that what are called matters or bodies are really groups of spiritual, immaterial powers, not manifestations of one "unknowable" "Force." Besides all this, there remains another—and, to my thinking, an insurmountable objection to Pantheism—and that is, the fact that every "*Ego*," every "I," rejects the assertion, that instead of being himself alone, and different from all other existences of which he has experience, he is a modification of some universal substance or god—rejects it, because it is an absolutely impossibility for him to accept it, unless he has previously accepted the idea of an "Infinite" "absolute unity," *which leaves him no choice but to reject the whole testimony of experience. And this he can do only by considering such experience to be an "illusion,"* whereas it is the idea of

"Infinite absolute unity" which is the delusion. An idea which is accepted without proof, and which—as in the case of Mr. Spencer—we have seen, can only be reached by reasoning from premises which careful examination shows to be false.

Thus, then, the Atheistic theory—not of the origin, for "origin" implies a beginning, but of the "self-existence" of the universe, which Mr. Spencer declared to be unthinkable, *is* thinkable, and is, in fact, the *only one* left to us.

Creation by external agency—or Theism—we cannot accept, because there is no sufficient evidence in its favour.

"Self-creation" we cannot accept, because it is an absurdity. Pan-theism we cannot accept, because, like Theism, it is unsupported by satisfactory evidence, and is contradicted by the whole sum of experience.

The only thing left to us is Pan-ism—Nature-ism, and the only source from which we can look for the origin of man is, therefore, Nature.

Mr. Spencer, like Dr. Flint, having entirely failed us, shall we accept this conclusion without question and as final? or shall we interrogate Nature, and ask it *how it* accounts for man?

CHAPTER XIV.

"NATURE."

THE RELATIONS OF SPACE AND BODIES—IS "SPACE" TO BE CONSIDERED AS INCLUDED IN "NATURE."

"NATURE." Yes; but what *is* Nature?

After having found ourselves obliged to reject Theism, Pan-theism—Self-creation, and so left ourselves nothing but Pan-ism or Nature-ism, to now ask what "is" Nature, seems to savour rather of folly than otherwise. Perhaps the question is not in reality quite so foolish as at the first glance it may seem to be. In reasoning, there are two specially prolific sources of error. The premises may be be wrong, or, the premises being correct, the inferences deduced may be wrong; or both premises and inferences may be wrong. The word Nature is our great premise. Is it quite certain that in that sum or totality for which the word stand we have left out nothing that ought to be included in it, or put into it anything which ought not to be there?

We, of course, include in the word Nature the seventy different groups of "powers," and the "forces" which are the result of their actions and interactions during their unlimited duration. But there is something besides this seventy—which may be more or may be fewer, but the exact number does not affect the question,—there is space. Is "space" to be included in what we call Nature? or is it to be considered as merely a kind of "condition" of the existence and action of the "seventy," but itself doing

nothing? Are we to consider the seventy as the positive of all existences and space as their negative? And what is the true relationship of the sum of things, and the space in which they exist and act?

We roughly say—Bodies "occupy" space. Now I want to form, if possible, some distinct idea of what is the true meaning of that word "occupy."

Let us suppose a hollow cube of clear, transparent glass of, say, twenty feet square. Let the cube be quite filled with water, and with water alone, the water to be absolutely pure. And let us suppose an exactly similar cube filled, not with water, but with water and one fish. The former would be full of water, the latter would be full of water and—fish.

In the first cube there would be water everywhere. In the second cube there would be water everywhere except where there was fish, or there would be fish everywhere except where there was water; for where there was water there could not be fish, and where was there fish there could not be water.

Let us suppose a third cube filled, like the first, with water, into which some one, possessed of the requisite ability, introduced, *without in any way reducing or taking out any of the water*, half-a-dozen fishes.

In the last case there would be water everywhere, but in some places there would *also* be fish; and this would imply that fish and water could co-exist in the same place at the same time.

The first cube, with only water in it, we can easily understand, also the second;—but the third!

Which of the two last is to be considered to truly represent the relationship existing between bodies and space? Do space and bodies exist alternately—as, no space where there is body—no body where there is space? or is there always and everywhere space, whether there be body or not?

We believe that space can exist without body, for there

are the interspaces between the stars, in which, so far as we know, there exist no "bodies," but only "forces;" and we know that forces are destructible—that equal amounts of opposing forces destroy one another. If the reasons I adduced for that belief should be considered valid, then, we have a proof that space and "forces" can exist in the same place at the same time, and that when Forces are destroyed, the space in which they existed still remains. If we suppose the fishes introduced into the *already completely-filled third tank*, to represent *forces*, then we can understand that the presence or absence of the "fishes" or "forces" does not in any way affect the "water" or "space," at least so far as its completely filling the tank is concerned; for, notwithstanding the presence of the introduced fishes, there would still be water everywhere.

Space is certainly pervaded by the "action" or "Force" of the "power" gravity. Suppose that within a square mile of space in which the only force-action present was gravity, gravity should be suddenly annihilated; we cannot suppose it would make any difference to or in that space; and *gravity not only pervades all "space," but all "bodies."* It acts *through all bodies or powers*, no matter how constituted, *and through all Forces as well*, just as if they were non-existent. *So that the gravity-force co-exists in the same place and at the same time with all other forces whatsoever.* And Heat-force, again, co-exists in the same place with gravity, and Light-force co-exists with Heat-force; and Heat-force can co-exist in the same place with all the powers of which the forces are the action. Is there any body in existence which is impervious to Heat?

In that mutual interaction of powers or bodies which results in what is called chemical union, wherein and whereby a new body is formed, it would certainly seem that they "interpenetrate" each other, and co-existence in the same place appears to occur.

One thing seems certain. If Powers—that is, bodies—exist to the "exclusion" of space—or space to the "exclusion" of

bodies—as in the case of the fish in the second cube, when fish excluded space, and space excluded fish—then any "addition" to the present sum of powers and space is "impossible," except by the *annihilation* of something already existing, to make room for what would be—*not "addition," but "substitution;"* for we cannot imagine any "nothings" waiting to be "filled" with "somethings." But powers do not produce powers, but only Forces, and space does not seem to produce either powers or forces. We have seen that it is impossible to suppose any beginning to space. Its nature is such that we have no choice but to consider it external and self-existent. In this we see that it "differs" from bodies or powers, for we are able to "suppose" *them* to be non-existent. We can "suppose" them beginning to be; we can suppose them to cease to be. It is true we cannot conceive *how* they should come to "be," or how they should cease to "be," but we are able to *think* of them as existing, or as ceasing to exist. But we cannot do so with space. We cannot, by any effort, suppose space non-existent. Therefore, we cannot think a beginning or an end of space. But as we *can* think non-existence of *bodies* or powers, we can also think of a "beginning to exist" of bodies. A beginning to exist of a new "group" of powers, or of a new "single" power, is supposable, while a beginning to exist of space is not even "supposable." Space and bodies or powers seem to be wholly and entirely *different*. Powers produce Forces, but space seems to produce nothing. We do not "know" space by anything we *get* from it, or from any *changes* in it, for it is always the same. We know it only by its "difference" from all bodies or powers, and the forces they produce. We know it exactly as we know ourselves, that like "ourselves" it is "different" from all other things. All we seem to be able to say of it is, that it is different from all other things—that it seems absolutely destitute of either power or force, for it offers no resistance whatever—that if there be not space where there is body, then space and bodies together

constitute infinity; or if space exists where bodies also exist, then space itself constitutes an Infinite. But as it exhibits neither power nor force, it is but a "negative" Infinite, and is, I was going to say, the same as nothing, which clearly it is not. For it "acts" in a paradoxical inactive, negative-positive kind of way, through its one perceivable mode of existence—extension. It is the constituent element of distance, and the "distance"—or "extension"—between Powers or bodies, and *the "distances" Powers and Forces have to travel, influences and modifies the whole series of the causations and affectuations of Nature*—that is, the "Nature" composed of the sum of powers which constitute the seventy different elementary atoms, or groups of Powers of which all things —except space—are composed.

Is space, then, to be included in "Nature," or not? Is it a component part of Nature, or is it something beyond and out of Nature, and Nature something *in* space?

Let us think of our three cubes filled with water.

The first cube, containing only water, we may call infinite space.

The second cube, containing water and one fish—where there is water there is not fish, where there is fish there is not water. In this case "Nature" would include water and fish, space and body, which together would be infinite.

The third cube contains water and half-a-dozen fishes. If there be water everywhere in this cube, whether there be fish or not, then the water or space would be infinite—the fishes being bodies or powers, and the water being infinite space;—then, I should say, the *fishes alone* could be called "Nature," and the water or infinite space could not be included in "Nature," but would *contain* "Nature;" and bodies or powers would "occupy" space.

It would seem, then, that practically—seeing space *does* nothing—"Nature" must mean for us only the seventy groups of force-producing powers we call atoms; in other words, the powers and Forces of "Nature;" *and it is from*

the actions and interactions of these powers and Forces that we must look for the "origination" of "man." For although there seem to be some facts which lead to the inference that space exists everywhere, whether there be bodies or not, seeing that *forces* certainly co-exist in the same place at the same time with space—seeing that they come *into* existence and *go out* of existence—*yet we have no proof whatever that "Powers" ever come into existence.* Space, therefore, we can consider as only *negatively* a "part" of "Nature," and being wholly passive may be left out of consideration; unless, in our further consideration of the "origin of man," we should find anything to the contrary.

CHAPTER XV.

FROM PHILOSOPHY TO SCIENCE. WHAT SCIENCE SAYS OF NATURE, AND THE ORIGIN OF MAN FROM NATURE. MR. HUXLEY ON "MAN'S PLACE IN NATURE." MR. DARWIN ON "LIFE."

THE CONSTANCY OF THE "ORDER OF NATURE"—THE DOCTRINE OF EVOLUTION, THAT ALL LIFE IS CONNECTED BY GRADATIONAL FORMS—"PROGRESSION FROM THE INORGANIC TO THE ORGANIC; FROM BLIND FORCE TO CONSCIOUS INTELLECT AND WILL"—BIOLOGISTS DENY THAT MAN'S POSITION IN NATURE IS PECULIAR AND ISOLATED—FROM MAN AT THE SUMMIT TO SPECKS OF ANIMATED JELLY AT THE BOTTOM OF THE SERIES—"VEGETABLE" SPECKS NOT TO BE DISTINGUISHED FROM "ANIMAL" SPECKS—ANIMAL AND VEGETABLE "FUNCTIONS" IDENTICAL, DIFFERENCES ARE OF DEGREE, NOT OF KIND—MR. DARWIN'S SKETCH OF (PROBABLE) "DESCENT OF MAN"—DARWIN'S BELIEF, "THAT ALL ORGANISMS START FROM A COMMON ORIGIN"—THE POSTULATE OF EVOLUTION—TELEOLOGICAL AND MECHANICAL VIEWS OF NATURE NOT NECESSARILY EXCLUSIVE—OBJECTIONS—MAN THE RESULT OF A PROCESS OF EVOLUTION, WHICH CHANGES THE QUESTION FROM "WHENCE COMES MAN?" TO "WHENCE COMES LIFE?" AND, ALSO "WHAT IS LIFE?"

In his book, "Man's Place in Nature" (page 57), Mr. Huxley says:—

"The question of questions for mankind—the problem which underlies all others, and is more deeply interesting than any other—is the ascertainment of the place which man occupies in Nature, and of his relations to the universe of things. Whence our race has come; what are the limits of our power over Nature, and Nature's power over us; to what goal are we tending; are the problems which present themselves anew and with undiminished interest to every man born into the world."

At page 1, "American Addresses":—

"We live in and form part of a system of things of

immense diversity and perplexity, which we call 'Nature;' and it is matter of the deepest interest to all of us that we should form just conceptions of the constitution of that system and of its past history. . . . It has taken long ages of toilsome and often fruitless labour to enable man to look steadily at the shifting scenes of the phantasmagoria of Nature, to notice what is fixed among her fluctuations, and what is regular among her apparent irregularities; and it is only comparatively lately—within the last few centuries—that the conception of a universal order and of a definite course of things, which we term the course of Nature, has emerged.

"But, once originated, the conception of the constancy of the 'order' of Nature has become the dominant idea of modern thought. To any person who is familiar with the facts upon which that conception is based, and is competent to estimate their significance, it has ceased to be conceivable that 'chance' should have any place in the universe, or that events should depend upon any but the natural sequence of cause and effect. We have come to look upon the present as the child of the past and as the parent of the future; and as we have excluded chance from a place in the universe, so we ignore, even as a possibility, the notion of any interference with the order of Nature.

" . . . But we must recollect that any human belief, however broad its basis, however defensible it seem, is, after all, only a probable belief, and that our widest and safest generalisations are simply statements of the highest degree of probability."

At page 46, "American Addresses," Mr. Huxley says, of the doctrine of Evolution, as expounded by Mr. Darwin:—

"If the doctrine of Evolution be true, it follows, that however diverse the different groups of animals and of plants may be, they must all, at one time or other, have been connected by gradational forms; so that, from the highest animals, whatever they may be, down to the lowest speck of

protoplasmic matter in which life can be manifested, a series of gradations, leading from one end of the series to the other, either exists, or has existed."

At page 108, of "Man's Place in Nature":—

"The whole analogy of natural operations furnishes so complete and crushing an argument against the intervention of any but what are termed 'secondary' causes, in the production of all the phenomena of the universe; that, in view of the intimate relations between man and the rest of the living world, *and between the forces exerted by the latter and all other forces*, I can see no excuse for doubting that all are co-ordinated terms of Nature's great progression, from the formless to the formed—*from the inorganic to the organic—from 'blind' force to 'conscious' intellect and will.*"

At page 142, "American Addresses," Mr. Huxley, speaking of the utility of the study of "Biology," says:—

"It is not only in the coarser practical sense of the word 'utility,' but in the higher and broader sense that I measure the value of the study of biology by its 'utility.' . . . For example, most of us attach great importance to the conception we entertain of the 'position' of man in this universe, and his relation to the 'rest' of Nature. We have almost all been told—and most of us hold by the tradition—that man occupies an 'isolated' and 'peculiar' position in Nature; that though he is 'in' the world he is not 'of' the world; that his relations to things about him are of a remote character; that his origin is recent, his duration likely to be short, and that he is the great 'central' figure round which other things in this world involve. But this is not what the biologist tells us.

". . . The biologists tell us that all this is an entire mistake. They turn to the physical organisation of man. They examine his whole structure, his bony frame and all that clothes it. They resolve him into the finest particles into which the microscope will enable them to break him up. They consider the performance of his various functions and

activities, and they look at the manner in which he occurs on the surface of the world. Then they turn to other animals, and taking the first handy domestic animal—say, a dog—they profess to be able to *demonstrate* that the analysis of the 'dog' leads them, in gross, to *precisely the same results* as the analysis of the 'man;' that they find almost identically the same bones having the same relations; that they can name the muscles of the dog by the names of the muscles of the man, and the nerves of the dog by those of the nerves of the man, and that such structures and organs of sense as we find in the man such also we find in the dog; they analyse the brain and spinal cord, and they find that the nomenclature which fits the one answers for the other. They carry their microscopic enquiries in the case of the dog as far as they can, and they find that his body is resolvable into the 'same' 'elements' as those of the man. Moreover, they trace back the dog's and the man's development, and *they find that at a certain stage of their existence the two creatures are not distinguishable the one from the other;* they find that the dog and his kind have a certain distribution over the surface of the world, comparable in its way to the distribution of the human species. What is true of the dog they tell us is true of all the higher animals; and they assert that they can lay down a common plan for the whole of these creatures, and regard the man and the dog, the horse and the ox, as minor modifications of one great fundamental unity. Moreover, the investigations of the last three-quarters of a century have proved, they tell us, that similar enquiries, carried out through all the different kinds of animals which are met with in Nature, will lead us *not* in one straight series, but by *many roads, step by step, gradation by gradation, from man, at the summit, to specks of animated jelly at the bottom of the series.* . . . More than this, when biologists pursue their investigations into the 'vegetable' world, they find that they can in the same way follow out the structure of the plant, from the most gigantic and complicated trees,

down through a similar series of gradations, until they arrive at '*specks of animated jelly*,' *which they are puzzled to distinguish from those* '*specks*' *which they reached by the* '*animal*' *road.*

"Thus, biologists have arrived at the conclusion that a fundamental 'uniformity' of structure pervades the animal and vegetable worlds, and that plants and animals differ from one another simply as diverse modifications of the same great general plan.

"Again, they tell us the same story in regard to the study of 'function.' They admit the large and important interval which, at the present time, separates the manifestations of the mental faculties observable in the higher forms of mankind, and even the lower forms—such as we know them—from those exhibited by other animals; but, at the same time, they tell us that the 'foundations' or rudiments of almost all the faculties of man are to be met with in the lower animals; that there is a 'unity' of mental faculty as well as of bodily structure, and that, here also, the difference is a difference of 'degree,' and not of 'kind'. I said 'almost all' for a reason. . . . It is, that while among various kinds of animals it is possible to discover traces of all the other faculties of man, especially the faculty of mimicry; yet that particular form of mimicry which shows itself in the 'imitation' of form either by modelling or drawing, is not to be met with."

Mr. Darwin, in the last chapter of "The Descent of Man" (page 609, second edition), says:—

"By considering the embryological structure of man—the homologies which he presents with the lower animals—the rudiments which he retains—and the reversions to which he is liable, we can partly recall in imagination the former condition of our early progenitors; and can approximately place them in their proper place in the zoological series. We thus learn that man is 'descended' from a hairy, tailed quadruped, probably arboreal in its habits, and an inhabitant

of the old world. This creature, if its whole structure had been examined by a naturalist, would have been classed among the quadrumana, as surely as the still more ancient progenitor of the old and new world monkeys. The quadrumana and all the higher mammals are probably derived from an ancient marsupial animal, and this through a long line of diversified forms, from some amphibian-like creature, and this again from some fish-like animal. In the dim obscurity of the past we can see that the early progenitor of all the vertebrata must have been an aquatic animal, provided with branchiæ, with the two sexes united in the same individual, and with the most important organs of the body (such as the brain and heart) imperfectly or not at all developed. This animal seems to have been more like the larvæ of the existing marine ascidians than any other known forms."

At page 424, of the sixth edition (1885) of "The Origin of Species," Mr. Darwin writes:—

"I believe that animals are descended from at most only four or five progenitors, and plants from an equal or lesser number.

"Analogy would lead me one step further, namely, to the belief that all animals and plants are descended from some one prototype. But analogy may be a deceitful guide. Nevertheless, *all* 'living' things have *much in common* in their 'chemical composition,' their 'cellular structure,' their 'laws of growth,' and their 'liability to injurious influences.' We see this even in so trifling a fact as that the same poison often similarly affects plants and animals; or that the poison secreted by the gall-fly produces monstrous growths on the wild rose or oak-tree. With *all* organic beings, excepting perhaps some of the very lowest, sexual reproduction seems to be essentially similar. With *all*, as far as is at present known, the germinal vesicle is the same; *so that all organisms start from a common origin.* If we look even to the two main divisions—namely, to the animal and vegetable

kingdoms—certain low forms are so far intermediate in character that naturalists have disputed to *which* kingdom they should be referred. As Professor Asa Gray has remarked, 'The spores and other reproductive bodies of many of the lower algæ may claim to have first a characteristically *animal*, and then an unequivocally *vegetable* existence.' Therefore, on the principle of natural selection with divergence of character, it does not seem incredible that, from some such low and intermediate form, *both animals and plants* may have been developed; and if we admit this, we must likewise admit that *all* the organic beings which have ever lived upon this earth *may be descended from some one primordial form*."

At page 305, "Critiques and Addresses," Mr. Huxley, speaking of teleology, or design, says of the "fundamental proposition of Evolution":—

"That proposition is, *that the whole world, living and not living, is the result of the mutual interaction, according to definite laws, of the forces possessed by the molecules of which the primitive nebulosity of the universe was composed.* If this be true, it is no less certain that the existing world lay, 'potentially,' in the cosmic vapour; and that a 'sufficient intelligence' could, from a knowledge of the properties of the molecules of that vapour, have predicted, say, the state of the fauna of Britain in 1869, with as much certainty as one can say what will happen to the vapour of the breath on a cold winter's day."

At page 307, Mr. Huxley says:—

"The teleological and mechanical views of Nature are not necessarily exclusive. On the contrary, the more purely a mechanist the speculator is, *the more firmly does he assume a 'primordial molecular arrangement' of which all the phenomena of the universe are the consequences;* and the more completely is he thereby at the mercy of the teleologist, who can always defy him to disprove that the 'primordial arrangement' was not *intended* to evolve the phenomena of the universe."

I have quoted the last passage because I think it indicates an oversight on the part of Mr. Huxley.

Unless we assume some power or being, external to the "primitive nebulosity;" and also, that unless the "primitive nebulosity" had a *commencement—a beginning*—there could be *no* "primordial" "arrangement." The "primitive nebulosity" could not be an "arrangement" without an Arranger, an Intender, a Designer. The existence of an Arranger being only an assumption, the argument of the teleologist would be futile. It is easy to prove design in human work because we have the designer, namely, man. Before we can prove design in Nature we must have proof of the existence of some Being who bears, in one respect, the same relation to Nature as man bears to the works which he has first "designed" and then produced.

The "design argument," as it is called, and upon which so much stress has been laid as affording proof of the existence of God, is absolutely valueless. It cannot by any possibility do more than establish the existence of some Being with such power over Nature as to be able intentionally to arrange some of its component parts in some desired way or ways. Even if such Being possessed such a mastery over Nature as to be able to arrange any or all its substances in such ways and forms as he pleased; still, such ability would in no way differ, except in extent, from similar ability possessed by man. According to the view I myself take of such a Being as we denominate God, the only satisfactory proof of his existence would be *an act, not merely of "design," but of "creation;"* and if we are to accept Mr. Mansel's reasoning on the subject, such a Being, and therefore such an act, are alike inconceivable. Matter and Space must together constitute Infinity. If they do not, there must be some place, or some space, where there is neither matter nor space, which we are unable to think; and unless—here comes the absurdity—there be some place where there is nothing, how can there be room for any new

creation? and how can there be a place, or space, where there is nothing, not even space?

The evidence in favour of the Darwinian exposition of the doctrine of "Evolution" seems to be so overwhelming that we have no choice but to accept it. When we ask the question—Whence came man? the answer, from the Darwinian standpoint, is clear and unhesitating. Man, like all other living creatures, is the result of a process of Evolution from the lowest form of life.

The form of the question we are considering becomes, thus, somewhat changed. Instead of asking—Whence comes man? we must now ask—Whence comes life? and also the further question—What is life?

CHAPTER XVI.

WHAT IS "LIFE?"

IS LIFE AN ULTIMATE "POWER," OR ONLY A COLLOCATION OF ATOMS AND THEIR FORCES?—IF LIFE DID NOT ALWAYS EXIST, ITS "BEGINNING" TO EXIST HAS TO BE "ACCOUNTED" FOR.

Is Life an *ultimate entity* or "*Power?*"—like gravity, for instance—or is it merely a result of some special "combination" of the ultimate elements or groups of powers which we call atoms? According to science it is simply the latter. What we call a "living" body is one which possesses the property of converting foreign matter into protoplasm—which is the "physical basis of Life"—and adding it to itself so that its magnitude is increased or sustained. Such increase we call growth. It has also another remarkable property, that of reproducing itself—of giving birth to, or producing, living bodies like itself. The state, or the process—or whatever it may be—which constitutes Life or Living, is attended with more or less waste of the "material" of the living body. The additions it makes to itself, and which—if in "excess" of the "waste" constitute "growth"—are made good by the process of converting foreign matter into protoplasm. The Living body, sooner or later, loses that power. When it does so it is said to "die." At death the decomposition of the plexus of elemental atoms of which the living body was composed, commences, and continues till they are more or less completely separated from each other and dispersed.

The combination of atoms which we call a living body is of such a nature that it cannot endure under the action of even a moderate heat. The spore can endure a greater heat than the adult. The highest heat any living creature has been known to survive—as shown in the experiments of Dr. Dallinger—is 290° F. It therefore follows that there was a time in the earth-history when, in consequence of the intense heat, no life could exist. But Life exists now, and, as geology shows us, has existed during countless ages. As it cannot, so far as we know, exist in any temperature higher than 290° F., it could not begin to exist until the earth's crust had sufficiently cooled to permit that combination of elemental substances which exhibits the phenomena which we call Life to take place; and so it would seem that the "origin" of "Life," since it has had a "beginning," has to be "accounted" for.

There is a very remarkable fact to be noted with regard to the present origination of Life. "Life" invariably arises from "antecedent" life; which gives rise to a difficulty. If, on the one hand, there was a time when it was impossible—on account of the intense heat of the earth's surface—that life should arise; and, on the other, that all our knowledge and experience of the "coming into existence" of life, being that it invariably comes from "antecedent" life; how could life "*begin*" at all? If we take the chemical elements which analysis shows us constitute living protoplasm, and put them together, we find that Life is not produced. Of course, it may be said that it is impossible to make a perfect analysis, because the moment you begin to analyse you kill the protoplasm, so that it is not "living" protoplasm which is "analysed," but protoplasm which is "dead."

I do not think this objection is valid. If Life is the result of a combination of elementary substances, then the analyses can be commenced only by separating some component of the combination from the rest; you cannot expect to retain the "result" of the combination while you *undo* that com-

bination. But analysis does not deprive the analyst of any of the combined substances. Let him continue his analysis until he has decomposed the whole combination. Let him, then, put them together again on the same order and under the same conditions of temperature, of succession, etc., as when he separated them. Let us suppose he has proceeded with the work of recombination till only *one* element has to be added, there will, of course, have, as yet, been no sign of Life, for one element is still lacking. But let him complete the synthesis by adding the final substance, and what ought to be the result? Why, Life of course! But Life does not result. The combination is as dead as were the individual atoms.

So far, Life would not seem to be the result of a combination of non-living elements.

CHAPTER XVII.

MR. TYNDALL ON SOLAR ACTION IN RELATION TO LIFE. THE INTERFERENCE OF WAVES. CONJECTURAL ORIGIN OF LIFE. NO SATISFACTORY PROOF OF "SPONTANEOUS GENERATION."

IT USED TO BE SUPPOSED THAT LIFE AND ITS PHENOMENA WERE TO BE ACCOUNTED FOR BY A SOMETHING CALLED "VITAL FORCE"—ADVANCED PHILOSOPHERS NOW CONSIDER IT PROVED THAT ALL VITAL ENERGY IS DERIVED FROM THE SUN—IN WHAT SENSE THIS IS TO BE UNDERSTOOD—THE "BUILDING UP" OF THE VEGETABLE, THEN, IS "EFFECTED" BY THE "SUN" THROUGH THE REDUCTION OF CHEMICAL COMPOUNDS—OBJECTIONS—ACTION OF CHLOROPHYLL IN DECOMPOSITION OF CARBONIC ACID, SUNLIGHT UNABLE TO DO IT ALONE, IT IS ONLY ONE OF THE "CONDITIONS"—SOLAR ACTION IS ENTIRELY "SEPARATIVE," NOT "CONSTRUCTIVE"—HOW IT AFFECTS "GROWTH" — PROFESSOR ALLMAN ON CHLOROPHYLL — "CELL-DIVISION" AND "GROWTH" NEED "DARKNESS," NOT LIGHT; REMARKABLE ILLUSTRATION OF—THE PRESENCE OF IRON IS AS NECESSARY AS THE PRESENCE OF SUNLIGHT FOR THE FORMATION OF CHLOROPHYLL—MR. TYNDALL'S ASSERTION THAT THE SUN, HAVING CAUSED WATER TO BE IN THE STATE OF VAPOUR, ALSO "LIFTS" IT—"RESTITUTION" OF FORCE (THAT IS, INDESTRUCTIBILITY OF FORCE)—OBJECTIONS—THAT THE CONDENSING OR CONTRACTING VAPOUR GENERATES HEAT—OBJECTIONS—THAT COLD "CONTRACTS" BODIES IS NOT TRUE—CONTRACTION CAUSED BY ATTRACTION OF COHESION—WHY THE SUN IN "CONTRACTING" PRODUCES HEAT—MR. TYNDALL'S ASSERTIONS CANNOT BE ACCEPTED—THE DOCTRINE OF "INTERFERENCE OF WAVES"—OBJECTIONS TO DEDUCTIONS FROM—THE MATTER OF THE ANIMAL BODY INORGANIC—THE COMPOUNDING OF INORGANIC INTO ORGANIC THE "MIRACLE" OF VITALITY —WOULD A "COOLING PLANET" GIVE RISE TO LIFE? MR. TYNDALL THINKS IT WOULD, ASKS "WHO WILL SET LIMITS TO THE POSSIBLE PLAY OF MOLECULES IN A COOLING PLANET?"—ANSWER, AND CONSIDERATION OF THE SUPPOSITION THAT DURING INFINITE TIME LIFE MUST NECESSARILY HAVE OCCURRED—THAT "ALL LIFE, THE HUMAN MIND, INTELLECT, EMOTION, WILL, WERE ONCE LATENT IN A FIERY CLOUD"—"IN THE FIRES OF THE SUN" —MR. TYNDALL'S OPINION AS TO THE ORIGIN OF LIFE—FINDS IT IN THE "POTENCY" OF MATTER—BUT CANNOT ACCEPT THE ALLEGED PROOFS OF THE OCCURRENCE OF SPONTANEOUS GENERATION.

IN the collection of essays and lectures by Professor Tyndall, entitled "Fragments of Science," there is one on "Vitality." Professor Tyndall being a scientist of the very highest rank, a consideration of his opinions cannot but be of the greatest interest. The essay in question commences at page 46 of vol. ii.—

"The '*origin*,' 'growth,' and 'energies' of living things are subjects which have always engaged the attention of thinking men. To account for them it was usual to assume a special agent, free to a great extent from the limitations observed among the powers of inorganic nature. This agent was called *vital force* [Mr. Tyndall's italics]; and under its influence plants and animals were supposed to collect their materials and assume determinate forms. Within the last few years, however, our ideas of vital processes have undergone profound modifications. . . . In tracing these phenomena through all their modifications, the most advanced philosophers of the present day declare that they ultimately arrive at a *single* source of power, from which all vital energy is *derived;* and the disquieting circumstance is, that this source is not the direct fiat of a supernatural agent, but a reservoir of what must be regarded as *inorganic* force. *In short, it is considered as proved that all the energy which we derive from plants and animals is drawn from the sun.*

"A few years ago, when the sun was affirmed to be the source of life, nine out of ten of those who are alarmed by the form which this assertion has latterly assumed, would have assented, in a general way, to its correctness. Their assent, however, was more poetic than scientific; and they were by no means prepared to see a rigid *mechanical* signification attached to their words. This, however, is the peculiarity of modern conclusions—'That there is no creative energy whatever in the animal or vegetable organism, but that all the power which we obtain from the muscles of men and animals, as much as that which we develop by the combustion of wood or coal, has been *produced* at the *sun's expense*.'"

Page 48.—"If, then, solar light and heat can be produced by the impact of dead matter—[referring to effects produced by impact of bodies falling into the sun]—and if, from the light and heat thus produced we can derive the energies which we have been accustomed to call *vital* [Mr. Tyndall's

italics], it undubitably follows that 'vital' energy may have a proximately '*mechanical*' origin.

"In what sense, then, is the sun to be regarded as the '*origin*' of the energy derivable from plants and animals? Let us try to give an intelligible answer to this question. 'Water' may be raised from the sea-level to a high elevation, and then be permitted to descend. In descending it may be made to assume various forms—to fall in cascades, to spurt in fountains, to boil in eddies, or to flow tranquilly along a uniform bed. It may, however, be caused to set complex machinery in motion—to turn millstones, throw shuttles, work saws and hammers, and drive piles. But every form of power here indicated would be derived from the original power expended in *raising* the water to the height from whence it fell. There is no energy *generated* by the machinery; the work performed by the water in descending is merely *the parcelling out and distribution of the 'work' expended in raising it.* In precisely this sense is all the energy of plants and animals the parcelling out and distribution of *a power originally exerted by the sun.* In the case of the water the *source* of the power consists in the forcible *separation* of a quantity of the liquid from a low level of the earth's surface, and its *elevation* to a higher position, *the power thus expended being 'returned' by the water in its descent.* In the case of *vital phenomena* the *source* of power consists in the forcible separation of the atoms of compound substances by the sun. We name the force which draws the water earthward 'gravity,' and that which draws atoms together 'chemical affinity,' but these different names must not mislead us regarding the qualitative identity of the two forces. They are both *attractions;* and to the intellect the falling together of carbon atoms against oxygen atoms is not more difficult of conception than the falling of water to the earth.

"The 'building up' of the *vegetable,* then, is *effected* by the *sun,* through the *reduction* of *chemical compounds.* The

phenomena of *animal* life are more or less complicated *reversals* of these processes of reduction."

Let us consider these statements.

Chlorophyll—the green colouring matter in plants—in the presence of "sunlight," decomposes carbon-dioxide, or carbonic acid. It assimilates the carbon and exhales the oxygen.

In this operation, what function is performed by the sun?

It is quite certain that sunlight "alone" cannot decompose carbon-dioxide. The carbonic acid is in the air through which the sunlight passes; but the sunlight—so far as decomposition of such carbonic acid is concerned—produces upon it no effect whatever. Decomposition of carbon-dioxide is effected by the *co-operation* of sunlight with the chlorophyll of the plant. *How* that decomposition is effected, and what are the particular functions of each, science has not yet determined. One thing is clear, that with the decomposition the function of sunlight is ended. I have, I hope, already shown that the function of sunlight—whether as heat, as light, or as actinic activity—is that of *separation*, and of separation *only*;—it is wholly destitute of constructive power.

Professor Sidney H. Vines, in his article, "Physiology" (Vegetable), in the ninth edition of the "Encyclopædia Britannica," (part 73, page 56), writes:—

"But the importance of a moderately high temperature for the maintenance of the active life of the plant, is not, as might be supposed, that it affords a continuous supply of 'energy' to be converted into 'work;' it is rather that it determines the *initiation* of chemical processes which are carried on by means of energy obtained from *other* sources."

How are we to interpret these facts, and what inferences are to be drawn from them?

The solar function is solely that of separation. We have seen bodies do not "*absorb*" heat, but that heat *penetrates* bodies, and in proportion to its intensity effects a greater or smaller separation of their molecules. One of its effects is the over-

coming, to a greater or less extent, of the forces of cohesity, etc., of a plant, as well as to "initiate chemical changes." An insufficient quantity of heat does not initiate or effect the needful changes. The powers resident in the plant cannot work freely, because the needful degree of "separation" has not been effected, and growth is consequently slow; for the processes of growth are effected with difficulty, or do not take place at all. If the supply of heat—light—actinism, is abundant, then the effect is the needful amount of separation of atoms, particles, molecules. The powers of the plant work easily, and the work done produces the maximum of effects. If the heat be excessive, then the separations effected are too great. The consequence is, that all the liquid matters—as water, juices, etc.—evaporate with destructive rapidity; water especially being removed. The action of cohesity, etc., is intensified, being almost entirely unopposed during the cold of the night. The various parts come closer and closer together, till the plant shrinks—shrivels—"dries up"—"dies." But if, with great amount of heat, there be an abundant supply of water and other plant food, then we have growth which is luxuriant, in fact we have tropical vegetation.

Will any one say that the Sun has had any share in "building up" the plant? I should say it has not had the ghost of an atom. The solar function is not to "build up," but to split in pieces. The function of Heat—however produced—is to separate. To separate—to divide—to split, is its work; and in doing its work it is destroyed, and in being destroyed it destroys an equal amount of opposing Force. All the "building up" of the plant is effected by the powers present in its "Protoplasm;" which, as Mr. Huxley says, is "the physical basis of Life."

In his Presidential Address to the British Association, 1879, Professor Allman says of "Chlorophyll":—

"To the presence of chlorophyll is due one of the most striking aspects of Nature—the green colour of the vegeta-

tion which clothes the surface of the earth, and with its formation is introduced a function of fundamental importance in the economy of plants, *for it is in the 'cells' which contain this substance that devolves the faculty of 'decomposing carbonic acid.'* On this depends the *assimilation* of plants, a process which becomes manifest externally by the exhalation of oxygen. Now it is under the *influence* of light on the chlorophyll-containing cells, that this evolution of oxygen is brought about. . . .

"With this dependence of assimilation *on the presence of chlorophyll*, a new physiological 'division of labour' is introduced into the life of plants. In the higher plants, while the work of 'assimilation' is allocated to the chlorophyll-containing cells, that of '*cell-division*' and '*growth*' devolves on *another set of cells*, which, *lying deeper in the plant, are 'removed' from the direct action of light, and in which chlorophyll is therefore never produced.* In certain lower plants, in consequence of their simplicity of structure and the fact that all the cells are *equally* exposed to the influence of light, the physiological division of labour shows itself in a somewhat different fashion. Thus, in some of the simple green algæ, such as *Spirogyra* and *Hydrodictyon*, 'assimilation' takes place as in other cases, during the *day*, while their *cell-division* and *growth* takes place chiefly, if not exclusively, at *night*. Strasburger, in his remarkable observations on cell-division in *Spirogyra*, was obliged to adopt an artificial device in order to *compel* the *Spirogyra* to *postpone the division of its cells to the morning.*

"Here, the functions of '*assimilation*' and '*growth*' devolve on *one and the same cell.* But while one of these functions is exercised only during the 'day,' the time for the other is the 'night.' It seems impossible for the same cell at the same time to exercise both functions, and these are here accordingly divided between different portions of the twenty-four hours."

In the formation of "Chlorophyll," the presence of *iron*

is also as necessary as the presence of sunlight. Respecting this, Dr. S. H. Vines writes—"Encyclopædia Britannia,"—article, "Physiology" (page 49) :—

"It appears that 'iron' may be absorbed (by plants) in the form of any of its salts. It is known to be essential only to those plants which contain 'chlorophyll.' If a seedling be cultivated by the method of 'water-culture' with its roots in a solution which contains no 'iron,' the leaves will be successively paler and paler, until at length they are nearly white; in this state the plant is said to be 'chlorotic.' If a small quantity of a 'salt of iron' be then added to the solution in which the roots are, or if the pale leaves be painted over with a dilute solution of 'iron,' they soon become green. 'Iron,' therefore, plays an important part in connection with the formation of the green colouring-matter of 'chlorophyll.' It is still a debated question whether or not iron enters into the formation of the chlorophyll-molecule."

We thus see that for the action of the reproductive cells, by which the "growth" or "building up" of the plant is effected, instead of the *presence of "sunlight"* being all essential, it is its *absence* which is necessary!

We see also that without the presence of "iron" in the plant the production of chlorophyll cannot be effected; and, again to quote the words of Professor Allman, "It is on the cells which contain this substance that devolves the faculty of decomposing carbonic acid. On this depends the 'assimilation' of plants."

We see also that the sole function of Heat—solar or other—is to separate—to divide—to split. For this reason, and for the other reasons adduced above, it is simply impossible that solar action, whether in the form of Heat, Light, or Actinic action can have any—even the smallest share in "building up" the plant. And if we observe the effect of solar action on the "sensitised" plate of the photographer—when a moment's exposure is sufficient to decompose portions of its surface—we shall find an additional reason for our

being unable to accept the dictum that "the building up" of the vegetable is effected by the sun through the reduction of chemical compounds. The solar function is merely to "assist" the plant in the decomposition of carbonic acid, which, being done, the powers present in the plant enable it to "assimilate the carbon," while it allows the "oxygen" to return to the atmosphere.

Professor Tyndall, like Mr. Herbert Spencer, seems to believe that when water is raised from the sea-level to a high elevation it is raised by the action of the sun. A distinct expression of this "belief" may be found in his essay, entitled, "Science and Man"—"Fragments of Sciences" (page 343, vol. ii.).

The passage, which I shall quote in full, is as follows. (For convenience of reference I have numbered the sentences):—

(1) "The sun warms the tropical ocean, converting a portion of its liquid into vapour, which rises in the air, and is condensed on mountain heights, returning in rivers to the ocean from whence it came. (2) Up to the point where condensation begins, an amount of heat exactly equivalent to the molecular work of vaporisation, and the mechanical work of lifting the vapour to the mountain tops, has disappeared from the universe. (3) What is the gain corresponding to this loss? (4) It will seem, when mentioned, to be expressed in a foreign currency. (5) The loss is a loss of 'heat;' the gain is a gain of 'distance,' both as regards masses and molecules. (6) Water which was formerly at the sea-level has been 'lifted' to a position from whence it can 'fall;' molecules which have been locked together as a liquid are now separate as vapour which can 're-condense.' (7) *After* condensation *gravity* comes into 'effectual' play, pulling the showers down upon the hills, and the rivers thus created, through their gorges to the sea. (8) Every rain-drop which smites the mountain produces its definite amount of heat; every river in its course develops

heat by the clash of its cataracts and the friction of its bed. (9) In the act of condensation, moreover, the molecular work of vaporisation is accurately 'reversed.' (10) Compare, then, the *primitive loss of solar warmth with the heat 'generated' by the 'condensation' of the vapour*, and by the subsequent *fall* of the water from cloud to sea. (11) They are mathematically 'equal' to each other. (12) No particle of vapour was 'formed' and 'lifted' without being paid for on the currency of *solar heat;* no particle returns as water to the sea without the exact quantitative '*restitution*' of *that* heat. (13) There is nothing 'gratuitous' in physical nature, no expenditure without equivalent gain, no gain without equivalent expenditure. (14) With inexorable constancy the one accompanies the other, leaving no nook or crevice between them for 'spontaneity' to mingle with the pure and necessary play of natural force. (15) Has this uniformity of Nature ever been broken? (16) The reply is—'not to the knowledge of science.'"

In the commencing sentence Mr. Tyndall states what is to be considered. (1) "The sun warms the tropical ocean, converting a portion of its liquid into vapour, which rises in the air and is re-condensed on mountain heights, returning in rivers to the ocean from whence it came."

The separating—dividing—splitting power of the sun's heat overcomes the cohesive attraction of some of the individual particles of the molecules of the water, which in that state of separation present a very much greater amount of surface than before, and so become practically lighter, as a "shaving" from a piece of wood becomes practically "lighter" than the solid mass of wood from which it was "planed."

(2) "Up to the point when condensation begins." That is, when in consequence of the surrounding atmosphere being colder than the vapour, the Heat present in the "vapour" radiates itself in the directions of the colder air, and the vapour cools. The Heat, while present in the

vapour, by its separating, wedge-like action, overcame the attraction of cohesion of the particles of vapour to each other, and so prevented their union or condensation. The Heat having departed into the surrounding air, cohesive attraction being unopposed, or insufficiently opposed, brought the vapour particles together—in other words, caused condensation.

"Up to the point where condensation begins, an amount of heat *exactly equivalent to the molecular work of vaporisation* and the *mechanical work of lifting* the vapour to the mountain tops has disappeared from the universe."

Was it then the "solar heat" which not only did the work of vaporisation, but also did the mechanical work of lifting the vapour to the mountain heights? How could such be the case? All the "work" done by the sun was to "split off" a certain amount of the water which it warmed —thus converting it into "vapour." But how could the heat *lift* the vapour? If it did, how was the operation performed? We might as well say that when the carpenter "separated" the "shaving" from the mass of wood of which it formed a part, that such act of separation should *also* "lift" it to "mountain heights." It was not "heat" that "lifted" the vapour, but "gravity." The "weight" of the surrounding air at the earth's surface being greater than the "weight" of the "vapour," by its superior "gravity" forced—lifted—squeezed the vapour upwards—forced it upward till, on account of the increasing "rarity," and consequent decreasing "weight" of the air, the weight of of the air and the vapour were equal, and the vapour could not be "lifted" any higher. How the vapour becomes recondensed I have already described. Condensation having taken place, the rain-drops present *less surface*, and gravity, which forced the water "upwards" when it was in the state of vapour, when it is condensed into rain-drops, "pulls" it down again.

The change of the water from the form of liquid to the

form of vapour is the whole of what was effected by the solar heat. The change from the state of vapour to the state of liquid—in the form of rain-drops—was effected by the action of the attraction of cohesion of the particles of water to each other. All the rest was effected by the action of gravity. Mr. Tyndall continues:—

(3) "What is the gain corresponding to this loss?"—the disappearance, that is, of the solar heat which Mr. Tyndall supposes not only "split off" the particles of water in the form of vapour, but also "lifted" the vapour to the mountain heights. Mr. Tyndall replies:—

(5) "The loss is a loss of 'heat;' the gain is a gain of 'distance,' both as regards masses and molecules. (6) Water which was formerly at the sea-level has been 'lifted' to a position from which it can 'fall;' molecules which have been locked together as a liquid are now separate as vapour, which can re-'condense.'"

"A gain of distance." Mr. Tyndall speaks as if a "gain of distance" necessarily carries with it the advantage of being able to "fall." When a locomotive has without a stop travelled a hundred miles, can we say of it that it has "gained distance?" and has the "distance" "gained" by the action of "heat" become "latent" in it? If it has, then why not make the "latent" "distance" and "heat" bring it back again over the hundred miles it had traversed to the point from whence it started, or carry it forward another hundred miles?

Mr. Tyndall says:—

(7) "After condensation, gravity comes into 'effectual' play."

I think it has been in perfectly "effectual *play*" all the time, for it alone has done the whole "*work*" of "lifting up" the vapour, and has now to do the whole work of "pulling" it down again.

(8) "Every rain-drop which smites the mountain, produces its definite amount of heat [through the action upon it of

gravity]; every river in its course develops heat by the clash of its cataracts and the friction of its bed [all due to the action upon it of gravity].

(9) "In the act of condensation, moreover, the molecular work of vaporisation is accurately reversed [by the action of the cohesive attraction of the particles to one another which the solar heat had previously overcome].

(10) "Compare then the primitive loss of solar warmth with the *heat 'generated' by the 'condensation' of the vapour*, and by the *subsequent fall of the water from cloud to sea.* (11) They are *mathematically equal* to each other."

Here matters come to a crucial point. Mr. Tyndall asserts that the quantity of "solar warmth" which was *lost*, and the "heat *generated* by the 'condensation' of the vapour," and by the subsequent *fall* of water (formed by the condensation of the "vapour" into water) are equal to each other. Mr. Tyndall does not content himself by asserting that they are merely "*equal*" to each other, but emphasises it to the utmost, by saying, "they are '*mathematically equal*' to each other."

If that assertion be not borne out by the facts, the whole of Mr. Tyndall's argument for the "conservation of energy" falls to the ground.

I need not, I hope, repeat my arguments on the same subject against the views of Mr. Spencer (to which the reader can refer) in relation to the "oscillating pendulum," the "india-rubber string," and the sun's supposed share in influencing geological change by raising water from lower to higher levels, so will confine myself to the one crucial point stated above.

There are two common statements regarding "contraction" and "expansion." On the one hand it is said that "cold" contracts bodies, while "heat" expands them.

I remember hearing of a very curious illustration of these facts.

At the annual examination of a small country village

school, there happened to be present a very distinguished party from the neighbouring "Great House," and the master of the school was, on that account, desirous that his pupils should acquit themselves in a satisfactory manner.

It happened that the master, being fond of the study of physical science, had given some of the cleverest of the boys a few simple lessons on that subject, and as the results had been better than he could have hoped for, he thought he might utilise such knowledge as they had acquired.

Accordingly, he asked various questions about the properties of heat, etc., and put the question—"What are the best known effects of heat and cold upon bodies."

There was an ominous silence, and the teacher's heart began to sink; but at last one of the boys replied—"Please, sir, heat expands bodies, and cold contracts them."

"Very good," said the master; "and, pray, can you give us an instance of such 'expansion' and 'contraction?'"

"Yes, sir," returned the boy. "In summer, when its hot, the heat expands the days and makes 'em long; and in winter, when its cold, the cold 'contracts the days and makes 'em short.'"

I do not know what became of that boy when he grew up—possibly he turned out a distinguished scientist. However, we will endeavour to do our best in relation to "contraction" "generating" heat.

In the first place, it is *not* "cold" that "contracts" bodies. It is the attraction of cohesion or cohesity that contracts bodies. If a body is so "hot" that the separative action of the heat keeps its particles from coming together by the action of cohesity; if the heat leaves that body—that is, if it becomes so "cold" that cohesity can act, then, not the "cold," but "cohesity," brings its particles together, and such coming together, or "contraction" or "condensation," causes the sum of particles to occupy a less space.

But it is said that contraction also produces heat. For

instance, one great source of the sun's heat is its contracting under the action of gravity.

The iron ring, which surrounds the rim of a cart-wheel—technically called a "tire"—is not secured in its position by bolts, but is "contracted on." That is, it is made red-hot, adjusted in its place, and then the wheel is plunged in cold water. The heat—which takes the line of least resistance—passes into the cold water, attraction of cohesion is able to act—the iron ring consequently "contracts" upon the rim of the wheel, and secures itself more firmly than could be effected by the blacksmith with any number of bolts, and it *remains* fixed. It does not, by "generating" heat during its "contraction," "expand" itself, and so become loose!

On the other hand, when the "sun" contracts, it is said to "produce" heat—as Mr. Tyndall affirmed the vapour "generated" heat, when the loss of heat enabled it to contract or condense into drops.

But if, when the vapour by loss of heat contracted, and in contracting generated heat, how did it manage to "remain" in the state of drops? Because it would seem that the heat, generated by "contraction," ought to split the "drops" back again into vapour. Also when the re-formed vapour cooled sufficiently to allow cohesity again to act, it ought to re-condense into drops; and the heat generated by the re-condensation ought again to split it into vapour, again to cool, again to condense, again to generate heat, again to be split up into vapour, and so on, *ad infinitum*.

But, in reality, the vapour, in contracting or "condensing" into a rain-drop, no more generated heat than the cart-tire did in "contracting" on the rim of the cart-wheel.

But merely to "assert" that it did *not* generate heat by contraction, while the sun *does* produce heat by contraction, is not enough: I must endeavour to give convincing reasons for my assertions. I will try to do so.

When the rain-drop and the cart-tire contracted, but did

not produce heat, the reason is obvious. In the case of both, the heat between their particles, by its separating, dividing, splitting action, kept their particles asunder—kept their attraction of cohesity from acting "effectually"—cohesity being an attraction which acts only at very small distances.

In the case of the cart-wheel, the plunging it into cold water was to prevent the red-hot tire from setting fire to the wood of the wheel, by causing the process of cooling to be effected very rapidly. Heat takes the direction of least resistance, and passing from the hot iron to the cold water, ceased to successfully resist the action of cohesity, which, accordingly, began to act without being opposed by heat. Heat is the result of impeded motion. The motion of the particles towards one another being *un*-impeded, no heat resulted. The "cold" did not "cause" contraction, but the withdrawal of the heat left cohesity to act unopposed; consequently, there being no impeded motion there was no friction, and there being no friction there was no heat.

The history of the condensation of the vapour into rain-drops is identical with that of the tire of the cart-wheel. The splitting, opposing, separating heat, which kept the particles of water in the state of vapour being withdrawn, the attraction of cohesion began to act effectually—the vapour condensed—contracted into "rain-drops" without producing heat at all.

But—Why, then, does the sun, in contracting, produce heat?

Because it does not, like the contracting tire and the contracting vapour, *contract without opposition*, but contracts against opposition, in *spite* of opposition. When the attraction of cohesion of the particles of vapour to each other is satisfied, there is no more motion. But gravitation, acting in the sun, acts *against other forces*—chemical attractions and repulsions, elasticity, electricity, magneticity, heat; —actions and reactions of all these forces; differences of temperature, differences of density, gases, liquids, solids—a

very chaos of elements; the consequences of which are inconceivable varieties of differences—inconceivable frictions —inconceivable intensities of heats—for the sun's gravity is twenty-seven and a-half times as great as that of the earth; so that a baby weighing ten pounds on the earth would, in the sun, weigh two hundredweight and a-half, or the eighth of a ton!

In a smaller body, such as the moon, we see what happens when "gravity" is, upon the whole, *weaker* than all the others forces together. Heat produced in opposition to contraction, etc., radiates itself more rapidly than it is produced, and, therefore, continuously becomes less in amount. In the end, the whole mass becomes cold, for chemical and mechanical equilibrium is complete and permanent. Masses and molecules—there being no action powerful enough to cause any alteration in their groupings—remain, under the action of their inherent, chemic, and cohesive attractions, unchanged and unchangeable. Its temperature being, except for the amount of heat it receives from the sun, absolute cold—which is 273° below zero.

The result of our examination of Mr. Tyndall's assertions that the "primitive solar warmth," and the "heat generated by the condensation of the vapour" into rain-drops, and the heat generated by the "subsequent fall of the water from cloud to sea, are mathematically equal to each other" cannot be maintained. The splitting off from the "tropical ocean" of certain particles, in the form of vapour, is *all* that has been effected by the "solar warmth."

The force by which such vapour was "lifted," "raised," "pushed," "squeezed up," was not "solar warmth," but "gravity."

The condensation, by the action of cohesional attraction of the vapour-particles into rain-drops, did not produce any heat whatever.

The heat produced by the "fall" of the water from "cloud to mountain top," and the "heat produced by every

river in its course, by the clash of its cataracts and the friction of its bed," are alike due to gravity, and to that alone.

During the whole of these processes there is not a vestige of "restitution." Every effect produced has been at the cost of destruction of force.

A curious illustration of the effect of the preconceived idea of the indestructibility of force in vitiating the judgment, is presented in the deductions made from what is termed the "interference of waves."

At page 391 of Mr. Tyndall's wonderful book on "Sound," he writes:—

"When several systems of waves proceeding from distinct centres of disturbance pass through water or air, the motion of every particle is the algebraic sum of the several motions impressed upon it.

"In the case of water, when the crests of one system of waves coincides with the crests of another system, higher waves will be the result of the coalescence of the two systems. But when the 'crests' of one system coincide with the 'sinuses' or 'furrows' of the other system, the two systems, in whole or in part, 'destroy' each other."

Page 54:—"We have then *still* water" [Mr. Tyndall's italics].

"This coalescence and 'destruction' of two systems of waves is called *interference*" [Mr. Tyndall's italics].

At page 362, Mr. Tyndall writes, respecting "interference" in relation to sound waves:—

"When two unisonant tuning-forks are sounded together, it is easy to see that the forks may so vibrate that the condensations of the one shall coincide with the condensations of the other, and the rarefactions of the one with the rarefactions of the other—[When the vibratory motion begins, it, by pushing the air in front of it forwards, causes "condensation," or pressing together of the particles of air in front of it, and at the same time causes "rarefaction," or

drawing further apart of the particles of air behind it]—If this be the case the two forks will assist each other, the condensations will, in fact, become *more* condensed, the rarefactions *more* rarefied; and it is upon this difference of density between the condensations and rarefactions that *loudness* depends; the two vibrating forks, thus supporting each other will produce a sound of greater intensity than that of either of them vibrating alone.

"It is, however, also easy to see that the two forks may be so related to each other that one of them shall require a condensation at the place where the other requires a rarefaction; that the one fork shall urge the air-particles *forward*, while the other urges them *backward*. If the opposing forces be equal, particles so solicited will move neither backwards nor forwards, the aerial *rest* which responds to *silence* being the result. Thus, it is possible by *adding* the sound of one fork to that of another, to *abolish* the sounds of both.

"We have here a phenomenon which, above all others, characterises wave-motion. *It was this phenomenon*, as manifested in optics, *that led to the 'undulatory theory' of light*, the most cogent proof of that theory being based upon the fact that, by 'adding' light to light, we may produce darkness, just as we can produce 'silence' by 'adding' sound to sound."

At page 64 of Mr. Tyndall's book on "Light," he writes:—"The principle of 'interference,' as proved by Young, applies to the waves of light as it does to the waves of water and the waves of sound; and the conditions of interference are the same in all three. If two series of light-waves of the same length start at the same moment from a common origin, crest coincides with crest, sinus with sinus, and the two systems blend together to a single system of *double amplitude*. If both series start at the same moment, one of them being, at starting, a *whole wave* in advance of the other, they also 'add' themselves together, and we have an augmented luminous effect. The same occurs when one system

of waves is any even number of semi-undulations in advance of the other. But if the one system be half a wave-length, or any *odd* number of half wave-lengths in advance, then the crests of the one fall upon the sinuses of the other; the one system, in fact, tends to *lift* the particles of ether at the precise places where the other tends to *depress* them [Mr. Tyndall's italics]; hence, through the joint action of these *opposing* forces *the light-ether remains perfectly still.* Thus stillness of the ether is what we call 'darkness,' which corresponds with a 'dead level' in the case of water."

Physical causation, or a change in the relations of substance to one another, is the result of a conflict of unequal forces. If a force or group of forces, expressed by the number 12, conflicts with another force or group of forces expressed by the number 18, the amount of change will be expressed, not by "18," but by 6; for equal amounts of opposing force destroy one another, and "12" in being destroyed would destroy 12 of the force "18," so that the amount of change would be only 6.

It seems to me that rightly considered the "interferences" of waves of sound and of waves of light and of waves of water alike afford illustrations of the correctness of what I have just asserted in relation to the "destruction" by each other of equal amounts of opposing forces.

When the crests of waves of water or air or light coincide, Mr. Tyndall says their forces coalesce or are "added" together and the waves are increased. When the crests of one system of waves are opposed to the furrows of another system—the forces being equal—then, to quote Mr. Tyndall's words, "The one system tends to *lift* the particles of ether [or water or light] at the precise places where the other [or others] tends to *depress* them; hence, through the joint action of these opposing forces the light-ether [or water, or air] remains perfectly still. Thus stillness of the ether is what we call 'darkness,' which corresponds with a 'dead level' [or "stillness"] in water,"—or with "silence" in

relation to sound, which means that equal amounts of Force have—to use Mr. Tyndall's own words—"abolished"—have "destroyed" each other.

"We have here a phenomenon which, above all others, characterises wave-motion. It was this phenomenon, as manifested in optics, that led to the undulatory theory of light, the *most cogent proof* of that theory being based upon the fact, that by '*adding*' light to light, we may produce 'darkness,' as we can produce 'silence' by '*adding*' sound to sound."

I think this is what Mr. Richard Swiveller would call "a most unmitigated staggerer." That the coincidence or coalescence of two like waves, and the consequent *doubling* of the force of the produced wave should be described as an "addition," is obviously and perfectly true; but to describe the mutual "abolition," the mutual "destruction," by each other of opposing forces as an "adding" of them together, is absolutely incomprehensible. Suppose two locomotive engines, travelling towards each other along the same line of rails, at the rate of a hundred miles an hour; or, better still, suppose two meteoric bodies, approaching each other at the rate of a hundred thousand miles an hour, were to meet, and shatter each other into dust, we might as well call this meeting and mutual destruction—an "addition!" It is not an "*addition*," but an "*opposition*." When we oppose equal amounts of light to each other, the result is mutual destruction—"*darkness*." When we oppose equal amounts of water-wave-producing force, the result is their mutual destruction—"*stillness*." When we oppose equal amounts of sound-producing aeriel force, the result is their mutual destruction—"*silence*." As Mr. Tyndall himself says—"Sound" (page 391)—"The two systems, in whole or in part, '*destroy*' each other." And I think that Mr. Tyndall then spoke the absolute *truth*.

At page 50, "Fragments of Science," vol ii, Mr. Tyndale, passing from the "building up" of the plant to a con-

sideration of the materials from which the plant is "compounded," says:—

"The matter of the animal body is that of inorganic nature. There is no substance in the animal tissues which is not primarily derived from the rocks, the water, and the air. Are the forces of organic matter, then, different in 'kind' from that of inorganic matter? The philosophy of the present day negatives the question. *It is the compounding in the organic world, of forces belonging equally to the inorganic, that constitutes the mystery and the miracle of 'vitality.'* . . . The tendency, indeed, of modern science is to break down the wall of partition between organic and inorganic, and *to reduce both to the operation of forces, which are the same in kind, but which are differently compounded.*"

But the "compounder!"—

At page 51.—"Supposing a planet, carved from the sun, set spinning round an axis, and revolving round the sun at a distance from him equal to that of our earth, would one of the consequences of its refrigeration be the development of organic forms? I lean to the affirmative. *Structural* forces [Mr. Tyndale's italics] are certainly in the mass, whether or not those forces reach to the extent of forming a plant or an animal. In an amorphous drop of water lie latent all the marvels of crystalline force; and who will set limits to the possible play of molecules in a cooling planet?"

The obvious reply to which is—"The play of molecules" in "a cooling planet"—or anywhere else—would be "limited" by the number of the molecules themselves, the numbers of the different *kinds* of molecules—the *number* and *nature* of the Powers of the different kinds of molecules—and the number of possible modifications and combinations of such a number of molecules and their powers; and whether they existed long enough for all those *possible* modifications to take place.

It has, by some, been asserted, that as during infinite time an infinite number of combinations of matter must have

occurred, that particular combination of matter we call "living" matter, must of "necessity" have arisen at some time or other; and that the origin of Life can thus be accounted for.

A moment's consideration will disclose the fallacy contained in this supposition.

Any *finite* number of atoms might, during infinite time, be combined an infinite number of *times*, but being but a "finite" number of atoms, they could not be combined in an *infinite* number of *different ways*. The *possible* number of *different* combinations of a finite number of atoms must necessarily be *finite*. A number of atoms capable of being combined in only a thousand different *ways* could not be combined through infinite time in *more* than a thousand ways; but they could be combined an infinite number of *times* in those "thousand" ways. Only an infinite number of *different* atoms could be combined in an infinite number of *different ways*. The number of atoms in the solar system not being infinite, the supposed *necessary* origination of Life could not take place from the cause assigned.

It is also to be observed that even if the *number* of atoms were infinite, it would not necessarily be sufficient to account for the origination of Life. There would need to be present all the different *particular kinds* of atoms needed for the purpose. Though the *number* were infinite, and were to be continuously combined in different ways during infinite time, yet if—amongst the infinite *number* of atoms, one particular *kind* of atom needed for the particular combination called life were not present Life could not arise. Its absence would render the origination of Life impossible. Supposing the *number* of atoms to be infinite, but that kind of atom we call carbon were wanting, it is perfectly certain that Life could not occur.

At page 132, Professor Tyndall says:—

"The hypothesis of natural Evolution— . . . what are the core and essence of this hypothesis? Strip it naked,

and you stand face to face with the notion—that not alone the more ignoble forms of animalcular or animal life, not alone the nobler forms of the horse and lion, not alone the exquisite and wonderful mechanism of the human body, but *the human 'mind' itself*, 'emotion,' 'intellect,' 'will,' and all their phenomena were *once latent in a fiery cloud.* . Many who hold it would probably assent to the proposition that at the present moment, all our philosophy, all our poetry, all our science, and all our art—Plato, Shakespeare, Newton, and Raphael—are *potential* in the *fires* of the sun."

Well, I think we may safely say—that wherever, or in whatever, they may be "potental," it is certainly *not* in the "fires of the sun." It would seem that Science is not less fallible than Theology and Philosophy.

At page 192, Professor Tyndall states his opinion respecting the "origin" of "Life."

"On tracing the line of life backwards, we see it approaching more and more to what we call the purely physical condition. We come at length to those organisms which I have compared to drops of oil suspended in a mixture of alcohol and water. We reach the *protogenes* of Hæckel, in which we have a type distinguishable from a fragment of albumen, only by its finely granular character. Can we pause here? We break a magnet and find two poles in each of its fragments. We continue the process of breaking; but however small the parts, each carries with it, though enfeebled, the polarity of the whole, and when we can break no longer, we prolong the intellectual vision to the polar molecules. Are we not urged to do *something* [Mr. Tyndall's italics] similar in the case of life? Is there not a temptation to close to some extent with Lucretius, when he affirms that 'Nature is seen to do all things spontaneously without the meddling of the gods?' or with Bruno, when he declares that 'matter is not that mere empty *capacity* which philosophers have pictured her to be, but the universal mother who brings forth all things as the fruit of her own womb' . . . Believing

as I do in the 'continuity of Nature,' I cannot stop abruptly where our microscopes cease be of use. Here the vision of the mind authoritatively supplements the vision of the eye. By a necessity engendered and justified by science I cross the boundaries of the experimental evidence, and discern in that *matter*, which we, in our ignorance of its latent powers, and notwithstanding our professed reverence for its Creator, have hitherto covered with approbrium, the promise and potency of all terrestrial life.

"If you ask me whether there is the least evidence to 'prove' that any form of life can be developed out of matter, *without demonstrable antecedent life*, my reply is, that evidence considered perfectly conclusive by many, has been adduced; and that were some of us who have pondered this question to follow a very common example, and accept testimony because it falls in with our belief, we also should eagerly close with the evidence referred to. But there is in the true man of science a desire *stronger* than the wish to have his beliefs upheld; namely, *the desire to have them true.* And this stronger wish causes him to reject the most plausible support, if he has reason to suspect that it is vitiated by error. [It is delightful to read such noble words.] Those to whom I refer as having studied this question, believing the evidence offered in favour of 'spontaneous generation' to be thus vitiated, cannot accept it. They know full well that the chemist now prepares from inorganic matter a vast array of substances, which were some time ago regarded as the sole product of vitality. They are intimately acquainted with the 'structural' power of matter, as evidenced in the phenomena of crystallisation. They can justify scientifically their *belief in its potency, under the proper conditions, to produce organisms. But . . . they will frankly admit their inability to point to any satisfactory experimental proof that life can be developed, save from demonstrable antecedent life.* As already indicated, they draw the line from the highest organisms through lower ones down to the lowest; and it is the *prolon*

gation of this line by the intellect beyond the range of the senses, that leads them to the conclusion which Bruno so boldly enunciated, 'that matter is not that mere empty *capacity* which philosophers have pictured her to be, but the universal mother who brings forth all things as the fruit of her own womb.'"

We have here stated the opinion of Mr. Tyndall.

What is the opinion of Mr. Huxley?

CHAPTER XVIII.

MR. HUXLEY ON BIOGENESIS AND ABIOGENESIS. MR. TYNDALL'S OPINIONS ON THE ORIGIN OF LIFE CONSIDERED.

MR. HUXLEY SUMS UP EVIDENCE ON BOTH SIDES—"CANNOT UNDERSTAND HOW CHOICE [IN FAVOUR OF BIOGENESIS, OR NO LIFE EXCEPT FROM DEMONSTRABLE "ANTECEDENT" LIFE] CAN BE EVEN FOR A MOMENT DOUBTFUL"—NEVERTHELESS DOES NOT SEE, WITH ADVANCE OF SCIENCE, WHY LIFE MAY NOT BE "ARTIFICIALLY" PRODUCED—"EXPECTATION" NOT "BELIEF"—AN ACT OF "PHILOSOPHICAL FAITH"—"REDI'S GREAT DOCTRINE OF BIOGENESIS," WHICH APPEARS TO ME [MR. HUXLEY], WITH THE LIMITATIONS I HAVE EXPRESSED, TO BE VICTORIOUS ALONG THE WHOLE LINE AT THE PRESENT DAY—OPINIONS OF MR. TYNDALL AND MR. HUXLEY—BOTH SEEM TO THINK THAT IF ABIOGENESIS HAS NOT OCCURRED, YET IT MAY OCCUR—WHAT IS LIFE?—TWO ANSWERS POSSIBLE—MR. TYNDALL CITES THE "CONTINUITY OF NATURE"—OBJECTIONS—FINDS IN "MATTER THE PROMISE AND POTENCY OF ALL TERRESTRIAL LIFE"—OBJECTIONS.

MR. HUXLEY, in his Presidential Address to the British Association for the Advancement of Science, 1870,—included in "Critiques and Addresses" under the title of "Biogenesis and Abiogenesis,"—discusses, in a most admirable manner, the question of the generation of Life. At page 236, "Critiques and Addresses," Mr. Huxley writes:—

"To sum up the effect of this long chain of evidence:—

"It is demonstrable that a fluid eminently fit for the development of the lowest forms of life, but which contains neither germs, nor any protein compound, gives rise to living things in great abundance *if it is exposed to ordinary air;* while no such development takes place if the air with which it is in contact is mechanically freed from the solid particles which ordinarily float in it, and which may be made visible by appropriate means.

"It is demonstrable that the great majority of these particles are destructible by heat, and that some of them are germs, or living particles, capable of giving rise to the same forms of life as those which appear when the fluid is exposed to unpurified air.

"It is demonstrable that inoculation of the experimental fluid with a drop of liquid known to contain living particles, gives rise to the same phenomena as exposure to unpurified air.

"And it is further certain that these living particles are so minute that the assumption of their suspension in ordinary air presents not the slightest difficulty. On the contrary, considering their lightness, and the wide diffusion of the organisms which produce them, it is impossible to conceive that they should not be suspended in the atmosphere in myriads.

"Thus the evidence, direct and indirect, in favour of *biogenesis* [or life only from antecedent life] for all known forms of life must, I think, be admitted to be of great weight.

"On the other side, the sole assertions worthy of attention are—that hermetically sealed fluids, which have been exposed to great and long-continued heat, have sometimes exhibited living forms of low organisation when they have been opened.

"The first reply that suggests itself, is the probability that there must be some error about these experiments; because they are performed on an enormous scale every day with quite contrary results. Meat, fruits, vegetables, the very materials of the most fermentable and putrescent infusions, are preserved to the extent, I may say, of thousands of tons every year, by a method which is a mere application of Spallanzani's experiment. The matters to be preserved are well boiled in a tin case provided with a small hole, and this hole is soldered up when all the air in the case has been replaced by steam. By this method they may be kept for

years without putrifying, fermenting, or getting mouldy. Now this is not because oxygen is excluded, inasmuch as it is now proved that free oxygen is not necessary for either fermentation or putrifaction. It is not because the tins are exhausted of air, for *vibriones* and *bacteria* live, as Pasteur has shown, without air or free oxygen. It is not because the boiled meats or vegetables are not putrescible or fermentable, as those who have had the misfortune to be in a ship supplied with unskilfully closed tins well know. *What is it, therefore, but the exclusion of germs?* I think that abiogenists are bound to answer this question before they ask us to consider new experiments of precisely the same order.

"And in the next place, if the results of the experiments I refer to are really trustworthy, it by no means follows that abiogenesis has taken place. The resistance of living matter to heat is known to vary within considerable limits, and to depend, to some extent, upon the chemical and physical qualities of the surrounding medium. But if, in the present state of science, the alternative is offered us—either germs can stand a greater heat than has been supposed, or *the molecules of dead matter, for no valid or intelligible reason that is assigned, are able to re-arrange themselves into living bodies, exactly such as can be demonstrated to be frequently produced in another way*—I cannot understand how choice can be, even for a moment, doubtful.

"But though I cannot express this conviction of mine too strongly, I must carefully guard myself against the supposition that I intend to suggest that no such thing as abiogenesis *ever* has taken place in the past, or ever *will* take place in the future. With organic chemistry, molecular physics, and physiology yet in their infancy, and every day making prodigious strides, I think it would be the height of presumption for any man to say that the conditions under which matter assumes the properties we call 'vital' may not, some day, be *artifically* brought together. All I feel

justified in affirming is, that I see no reason for believing that the feat has been performed *yet*.

"And looking back through the prodigious vista of the past, *I find no record of the commencement of life*, and therefore I am devoid of any means of forming a definite conclusion as to the conditions of its appearance. *Belief*, in the scientific sense of the word, is a serious matter, and needs strong foundations. To say, therefore, in the admitted absence of evidence, that I have any 'belief' as to the mode in which the existing forms of life have originated, would be using words in a wrong sense. But *expectation* is permissible where 'belief' is not; and if it were given to me to look beyond the abyss of geologically recorded time to the still more remote period when the earth was passing through physical and chemical conditions, which it can no more see again than a man can recall his infancy, *I should 'expect' to be a witness of the evolution of living protoplasm from not-living matter.* I should 'expect' to see it appear under forms of great simplicity, endowed, like existing fungi, with the power of determining the formation of new protoplasm from such matters as ammonium, carbonates, alkaline and earthy phosphates, and water, *without the aid of 'light.'* That is the 'expectation' to which analogical reasoning leads me; but I beg you once more to recollect that I have no right to call my opinion anything but an act of 'philosophical faith.'

"So much for the history of the progress of Redi's great doctrine of Biogenesis, which appears to me, with the *limitations* I have expressed, to be *victorious along the whole line at the present day.*"

I think no one can doubt that Mr. Huxley is one of those "true men of science" in whom there is "a desire stronger than the wish to have his beliefs upheld—namely, 'the desire to have them true.'"

Mr. Tyndall and Mr. Huxley both admit that no sufficient evidence that spontaneous generation, or the origination of

life, through the interaction of matter and force, without the help of antecedent life, has ever taken place, yet it seems to be the opinion of both that it has taken place, or may take place. Is such an opinion justifiable? Let us consider the statements made by Mr. Tyndall and by Mr. Huxley, respectively, in the quotations given above.

Mr. Tyndall says:—

"On tracing the line of life backwards, we see it approaching more and more to what we call the purely physical condition."

By the "purely physical condition," I presume Mr. Tyndall means what is generally called the inorganic state. But a living thing however, nearly it may approach the purely physical condition, certainly never reaches it—just as a curved line can never "become" a straight line; for at the instant of becoming straight, it *ceases* to be curved. For how can a given line be at the same time both "straight" and "curved?" Its reaching that condition, and its ceasing to *be* "living matter," occur simultaneously. To be in the "purely physical condition," it must be dead. The lowest—I will not use that word—the "earliest" form of Life is Protoplasm—that is, living protoplasm. Kill it, and the dead protoplasm is mere physical matter. What is "living" matter? To this question there are certainly two answers. It is either matter arranged in a particular way—the phenomenon of life being the effect or result of such arrangement; or, it is matter with some kind of force or power *infused into it* from some source other than any power, or combination of those powers which we are accustomed to call the powers of inorganic nature. To come, if possible, to some distinct conclusion on this subject—that is to say,—whether life is a result of the action of *inorganic nature;* or owes its existence to some power *other than inorganic nature,* and had a "beginning," is our present object.

Mr. Tyndall proceeds:—

"We come at length to those organisms which I have

compared to drops of oil suspended in a mixture of alcohol and water. We reach the *protogenes* of Hæckel, in which we have a type distinguishable from a fragment of albumen only by its finely granular character. Can we pause here? We break a magnet, and find two poles in each of its fragments. We continue the process of breaking; but however small the fragments, each carries with it, though enfeebled, *the polarity of the whole.* And when we can break no longer, we prolong the intellectual vision to the polar molecules. Are we not urged to do *something* similar in the case of life?"

I am afraid this illustration tells against, not for, Mr. Tyndall. Into however minute fragments we may break the magnet, do we ever get anything else than smaller and smaller fragments of the "magnet," each of which possesses the magnetic element, and is as truly a "magnet" as that larger magnet of which it is but a "fragment." Does the illustration give us the smallest assistance in understanding, or rather, trying to imagine, the origin of Life?

Mr. Tyndall continues:—

"Is there not a temptation to close to some extent with Lucretius when he affirms that Nature is seen to do all things spontaneously of herself without the meddling of the gods? or with Bruno, when he declares that matter is not that empty *capacity* which philosophers have pictured her to be, but the universal mother who brings forth all things as the fruit of her own womb? Believing, as I do, in the *continuity of Nature*—"

But the very question which is being considered is—*Is* Nature "continuous?" in other words—*Is Life natural or supernatural?* There *was* a time when there was no life. It must therefore have had a beginning. If inorganic nature did *not* begin it, then the "continuity" of inorganic nature with organic nature is a delusion, and cannot be advanced as an argument, seeing it is apparently contradicted by the very existence of Life. To *establish* the doctrine of the

"continuity" of Nature, it must be proved—so far as such a thing *can* be "proved"—that inorganic nature "originated" Life. For, if it has not, there has been a "break," and "organic" nature is not "continuous" with "inorganic" nature, and Life must be "super"-inorganic-nature-al, or, to express it briefly, must be "supernatural." To return to Mr. Tyndall:—

"Believing, as I do, in the 'continuity of Nature,' I cannot stop abruptly where our microscopes cease to be of use. Here the vision of the mind authoritavely supplements the vision of the eye. By a necessity engendered and justified by science, I cross the boundary of the *experimental* evidence, and discern in that 'matter' which we, in our ignorance of its latent powers, and notwithstanding our professed reverence for its Creator, have hitherto covered with opprobrium, 'the promise and potency of all terrestial life.'"

It seems to me that the necessity engendered and justified by science distinctly "forbids" us "to cross the boundary of the experimental evidence;" for, in the very next sentence after the one I have just quoted, Mr. Tyndall continues:—

"If you ask me whether there exists the least evidence to *prove* that any form of life can be developed out of 'matter,' *without demonstrable antecedent life*, my reply is . . . Those to whom I refer as having studied this question, believing the evidence offered in favour of 'spontaneous generation' to be thus vitiated, cannot accept it. They know full well that the chemist now prepares from inorganic matter a vast array of substances, which were some time ago regarded as the sole products of vitality. They are intimately acquainted with the structural power of matter as evidenced in the phenomena of crystallisation. They can justify scientifically their *belief* in its potency, under the proper conditions, to produce organisms. But they will frankly admit their inability to point to any satisfactory proof that life can be developed, save from demonstrable antecedent life. As already indicated, they draw the line from the highest organisms

through lower ones down to the lowest; and it is the prolongation of this line by the intellect, beyond the range of the senses, that leads them to the conclusion which Bruno so boldly enunciated."

Mr. Tyndall finds himself, then, unable to accept the evidence in favour of "spontaneous generation."

Even if the "chemist" were *able* to prepare from inorganic matter not only "a vast array of substances, which were some time ago regarded as the sole products of vitality," but the *whole* of the "substances" of which a given organism—say, a human being—is composed, it would not in the smallest degree support the "belief" that matter of itself produces life, *for none of the substances so produced would be "living." Matter itself never lives at all.* When we say of matter that it is "alive," we mean that there is present in it a "power" which we call "Life." When that power leaves it, it is said to be "dead." In reality it is exactly the same as it was when it was said to be alive. Suppose a man to die instantaneously in consequence of being struck by lightning. Some parts of his body would, no doubt, be disorganised; but other parts would not. The only change in the latter would be that life was gone. Of course, the elements of which the body was composed, being no longer *dominated* by that "something" which we call Life, would at once begin each to act in its own way, and decomposition would commence. If we suppose the weather to be very cold, and fermentive germs comparatively few and inactive, decomposition will proceed slowly; if it be very hot, the increased action of heat—of the universal "separator"—will so assist the operating forces—fermentive, putrescent, and others—that decomposition will be rapid. If the chemist could recompose the matter so decomposed so that we should have the man again, it would not be a living, but a *dead man.* The chemist might "recompose him," but he could not make him "live."

The "*chemist*" would, so far as "organisation" went, stand

in the "place" of that which we call Life, for it is "Life" that "organises." But he could not, having recomposed the body, give to it that "power" which had enabled himself to recompose the body—that power which we call Life.

As to the "structural" power of matter exhibited in the phenomena of crystallisation, it bears no resemblance to the phenomena of organisation.

Crystallising power can only aggregate in fixed forms particular kinds of matter. It cannot take non-crystallisable matter and convert it into crystallisable matter. When we speak of "organising" anything, *it implies some "end" other than mere "aggregation." It implies some use.* Organisation does not take place for the *sake* of organisation, but to serve some purpose. The power of crystallising is solely structural; organising power it does not possess.

"The men of science"—Mr. Tyndall continues—"can justify scientifically their '*belief*' in its [matter's] 'potency' under the proper conditions to produce organisms." But that begs the question. It implicitly assumes that matter *can* produce organisms, and that all that is required is the presence of the "proper conditions;" and no proof is given that there *are* any "proper conditions" at all, other than the presence of antecedent Life, under which matter can produce organisms, and then the organism is not "*produced*" by "matter," but by the life present *in* the matter. Indeed, Mr. Tyndall would seem to recognise so much, when in the very next sentence he says:—

"But in reply to your question, they will frankly admit their inability to point to any satisfactory proof that life can be developed, *save from demonstrable antecedent life.* As already indicated, they draw the line from the highest organisms through lower ones down to the lowest; and it is the prolongation of this line by the intellect, beyond the range of the senses, that leads them to the conclusion which Bruno so boldly enunciated."

We have here a repetition of the fallacy of the re-

peatedly broken magnet. But however often you break it, it cannot, by any "prolongation" of the "line" of magnets by the "intellect, beyond the range of the senses," give us anything but magnets of continually decreasing magnitude; so, however far the "line" of life, commencing with the highest organisms, may be "prolonged by the intellect, beyond the range of the senses," it can only give life of less and less magnitude, not the *production* of living organisms out of non-living matter. The only "fitting condition" for the production of Life is antecedent life; and that we should—until there shall be adduced demonstrable evidence to the contrary—so "believe," is, I think, a "necessity engendered and justified by science."

CHAPTER XIX.

MR. HUXLEY ON PROTOPLASM AS THE PHYSICAL BASIS OF LIFE. WHENCE COMES LIFE?

MR. HUXLEY'S "ACT OF PHILOSOPHICAL FAITH"—WHAT IS THE ULTIMATE FATE, AND WHAT THE ORIGIN OF THE MATTER OF LIFE?—PROFESSOR MICHAEL FOSTER ON PROTOPLASM—AN AMŒBA (OR JELLY-SPECK), DESCRIPTION OF—ITS POWERS—MOVEMENTS—DISPLAYS RUDIMENTARY "VOLITION"—NOT ONLY MOBILE, BUT SENSITIVE—EXHIBITS RUDIMENTS OF MUSCULAR AND NERVOUS POWERS—DESCRIPTION OF PROTOPLASM—ITS "METABOLISM"—KATABOLIC CHANGES—ANABOLIC CHANGES—ANALYSES OF SUCH CHANGES—PROPERTIES OF PROTOPLASM—ASSIMILATION—MOVEMENT OR CONTRACTILITY—IRRITABILITY OR SENSITIVENESS—ALL OF WHICH ARE PRESENT IN PROTOPLASM WHEREVER FOUND—MOST WONDERFUL OF ALL IS ITS POWER OF RE-PRODUCING ITS LIKE—CONSIDERATION OF MR. HUXLEY'S REASONS FOR HIS "ACT OF PHILOSOPHICAL FAITH"—THE MATERIALS OF PROTOPLASM ARE ORDINARY INORGANIC MATTER—CARBON, OXYGEN, HYDROGEN, AND NITROGEN—WITHDRAW ONE OF THESE FROM THE WORLD, AND ALL VITAL PHENOMENA WOULD CEASE—THEY ARE ALL LIFELESS, BUT UNDER CERTAIN CONDITIONS THEY GIVE RISE TO PROTOPLASM, WHICH EXHIBITS THE PHENOMENA OF LIFE—AN ELECTRIC SPARK BEING PASSED THROUGH OXYGEN AND HYDROGEN WE HAVE WATER—THE "PROPERTIES" OF THE WATER (FORMATION OF ICE, ETC.), RESULT FROM THE PROPERTIES OF THE COMPONENT ELEMENTS OF THE WATER—WE DO NOT SUPPOSE AN UNKNOWN POWER "AQUOSITY" TO HAVE ENTERED THE WATER—WHAT BETTER STATUS HAS VITALITY THAN "AQUOSITY?"—"THE PROPERTIES OF WATER RESULT FROM THE NATURE AND DISTRIBUTION OF ITS MOLECULES, AND MR. HUXLEY CAN FIND NO INTELLIGIBLE GROUND FOR REFUSING TO SAY THAT THE PROPERTIES OF PROTOPLASM RESULT FROM THE NATURE AND DISPOSITION OF ITS MOLECULES"—MR. HUXLEY'S REASONINGS CONSIDERED, AND OBJECTIONS—WHAT IS LIFE, THEN?—AN ANSWER TO THAT QUESTION.

MR. HUXLEY having, as we have seen, examined the evidence adduced by believers in "spontaneous generation" in support of their "faith," sums up dead against that doctrine, and expresses his opinion that the "doctrine of Biogenesis, with the limitations I have expressed, is victorious along the whole line at the present day."

He does not, however, himself endorse that opinion, but says:—"If it were given to me to look beyond the abyss

of geologically-recorded time to the still more remote period when the earth was passing through physical and chemical conditions, which it can no more see again than a man can recall his infancy, I should expect to be a witness of the 'evolution' of living protoplasm from *non-living* matter." And this "expectation" he describes, not as a "belief," but as "an act of philosophical faith."

It will be supremely interesting to enquire—What are the grounds of that "act of philosophical faith?"

In his article on "The Physical Basis of Life"—which we shall find in Mr. Huxley's "Lay Sermons, Essays and Reviews" (page 129)—Mr. Huxley thus speaks of Protoplasm:—

"Protoplasm, simple or nucleated, is the formal basis of all life. It is the clay of the potter; which, bake it and paint it as he will, remains clay, separated by artifice, and not by Nature, from the commonest brick or sun-dried clod.

"Thus it becomes clear that all living powers are cognate, and that all living forms are fundamentally of one character. The researches of the chemist have revealed a no less striking uniformity of material composition in living matter.

Page 130.—"That all the forms of protoplasm which have yet been examined contain the four elements, carbon, hydrogen, oxygen, and nitrogen, in very complex union, and that they behave similarly towards several reagents."

Mr. Huxley describes Protoplasm as "the clay of the potter." Is there then a "potter?" or is there the clay only?

Page 131.—"And, now, what is the ultimate fate, and what the origin of the 'matter of life?'

"Is it, as some of the older naturalists supposed, diffused throughout the universe in molecules, which are indestructible and unchangeable in themselves; but in endless transmigration unite in innumerable permutations, into the diversified forms of life we know? Or is the matter of life composed of *ordinary* matter, differing from it only in the

'manner' in which its atoms are aggregated? Is it built up of ordinary matter, and again resolved into ordinary matter when its work is done?

"Modern science does not hesitate a moment between these alternatives. . . . Under whatever disguises it takes refuge, whether fungus or oak, worm or man, the living protoplasm not only ultimately dies, and is resolved into its mineral and lifeless constituents, but is always dying, and, strange as the paradox may sound, could not live unless it died."

Page 134.—" . . . In seeking for the origin of protoplasm we must eventually turn to the vegetable world. . . . The 'animal' can only raise the substance of dead protoplasm to the higher power, as one may say, of living protoplasm; while the plant can raise the less complex substances—carbonic acid, water, and ammonia—to the same stage of living protoplasm, if not to the same level."

Mr. Huxley's article was published in 1869. Since then an immense amount of further knowledge of protoplasm has been gained. In order to obtain as complete data as possible before we attempt to consider the validity of the reasons given by Mr. Huxley for his "act of philosophical faith," it will be well to acquaint ourselves with some of the latest conclusions of science with respect to the nature and properties of "The Physical Basis of Life." In order to do so we will consult Professor Michael Foster's splendid article in the "Encyclopædia Britannica" on "Physiology" (ninth edition, 1886). At page 12, vol. xix, Professor Foster writes:—

"In its simplest form, a living being, as illustrated by some of the forms often spoken of as amœbæ, consists of a mass of substance in which there is no obvious distinction of parts. In the body of such a creature even the highest available powers of the microscope reveal nothing more than a fairly uniform network of material, a network sometimes compressed, with narrow meshes; sometimes more

open, with wider meshes; the intervals of the mesh-work being filled, now with a fluid, now with a more solid substance, or with a finer and more delicate network, and minute particles or granules of variable size being sometimes lodged in the open meshes, sometimes deposited in the strands of the network. Sometimes, however, the network is so close, or the meshes filled up with material so identical in refractive power with the bars or films of the network, and at the same time so free from granules, that the whole substance appears absolutely homogeneous, glassy, or hyaline. Analysis with various staining and other reagents leads to the conclusion that the substance of the network is of a different character from the substance filling up the meshes. Similar analysis shows that at times the bars or films of the network are not homogeneous, but composed of different kinds of stuff; yet even in these cases it is difficult, if not impossible, to recognise any definite relation of the components to each other such as might deserve the name of structure; and certainly in what may be taken as the more typical instance, where the network seems homogeneous, no microscopic search is able to reveal to us a distinct structural arrangement in its substance. In all probability optical analysis, with all its aids, has here nearly reached its limits; and though not wholly justified, we may perhaps claim the right to conclude that the network in such case is made up of a substance in which no distinction of parts will ever be visible, though it may vary in places or at times in what may be spoken of as molecular construction, and may carry, lodged in its own substance, a variety of matters foreign to its real self. This remarkable network is often spoken of as consisting of *protoplasm*, and though that word has come to be used in several different meanings, we may for the present retain the term. The body of an amœba, then, or of a similar organism, consists of a network or framework which we may speak of as protoplasm, filled up with other matters. In

most cases it is true that in the midst of this protoplasmic body there is seen a peculiar body of a somewhat different and yet allied nature, the so-called nucleus; but this, we have reason to think, is specially concerned with processes of division or reproduction, and may be absent, for a time at all events, without any injury to the general properties of the protoplasmic body.

"Now such a body, such a mass of simple protoplasm, homogeneous—save for the admixtures spoken of above—is a living body, and all the phenomena which we sketched out at the very beginning of this article, as characteristic of the living being, may be recognised in it. There is the same continued chemical transformation, the same rise and fall in chemical dignity, the same rise of the dead food into the more complex living substance, the same fall of the living substance into simpler waste products. There is the same power of active movement, a movement of one part of the body upon another giving rise to a change of form, and a series of changes of form resulting eventually in a change of place. In what may be called the condition of rest the body assumes a more or less spherical shape. By the active transference of part of the mass in this or that direction the sphere flattens itself into a disc, or takes on the shape of a pear, or of a rounded triangle, or assumes a wholly irregular —often star-shaped or branched form. Each of these transformations is simply a rearrangement of the mass, without change of bulk. When a bulging of one part of the body takes place there is an equivalent retraction of some other part or parts; and it not unfrequently happens that one part of the body is frequently thrust forward, bulging succeeding bulging, and each bulging accompanied by a corresponding retraction of the opposite side, so that, by a series of movements the whole body is shifted along the line of the protuberances. The tiny mass of simple living matter moves onward, and that with some rapidity, by what appears to be a repeated flux of its semi-liquid substance.

"The internal changes leading to these movements may begin, and the movements themselves be executed, by any part of the uniform body; and they may take place without any obvious cause. So far from being always the mere passive results of the action of extrinsic forces, they may occur spontaneously, that is, without the coincidence of any recognisable disturbance whatever in the external conditions to which the body is exposed. *They appear to be analogous to what in higher animals we speak of as acts of volition.* They may, however, be provoked by external conditions. A quiescent amœba may be excited to activity by the touch of some strange body, or by some other event—by what in the ordinary language of physiology is spoken of as a stimulus. The protoplasmic mass is not only 'mobile' but 'sensitive.' When a stimulus is applied to one part of the surface a movement may commence in another and quite distant part of the body; that is to say, molecular disturbances appear to be propagated along its substance without visible change, after the fashion of the nervous impulses we spoke of in the beginning of this article. The uniform protoplasmic mass of the amœba exhibits the rudiments of those attributes or powers which in the initial sketch we described as being the fundamental characteristics of the 'muscular' and 'nervous' structures of the higher animals.

"These facts, and other considerations which might be brought forward, lead to the tentative conception of protoplasm being a substance (if we may use the word in a somewhat loose sense) not only unstable in Nature but subject to incessant change, existing indeed as the expression of incessant molecular, that is, chemical and physical change, very much as a fountain is the expression of an incessant replacement of water. We may picture to ourselves this total change which we denote by the term '*metabolism*,' as consisting on the one hand of a downward series of changes (*katabolic* changes), a stair of many steps, in which more complex bodies are broken down with the setting free of energy into

simpler and simpler waste bodies, and on the other hand of an upward series of changes (*anabolic* changes), also a stair of many steps, by which the dead food, of varying simplicity or complexity, is, with the further assumption of energy, built up into more and more complex bodies. The summit of this double stair we call 'protoplasm.' Whether we have a right to speak of it as a single body, in the chemical sense of that word, or as a mixture in some way of several bodies; whether we should regard it as the very summit of the double stair, or as embracing as well the topmost steps on either side, we cannot at present tell. Even if there be a single substance forming the summit, its existence is absolutely temporary; at one instant it is made, at the next it is unmade. Matter which is passing through the phase of life rolls up the ascending steps to the top, and forthwith rolls down on the other side. But to this point we shall return later on. Further, the dead food itself fairly, but far from wholly, stable in character, becomes more and more unstable as it rises into the more complex living material. It becomes more and more explosive, and when it reaches the summit its equilibrium is overthrown and it actually explodes. The whole downward stair of events seems in fact to be a series of explosions, by means of which the energy latent in the dead food and *augmented by the 'touches' through which the dead food becomes 'living' protoplasm,* is set free."

What are those "touches?"

"Some of this freed energy is used up again within the material itself in order to carry on *this same 'vivification' of dead food;* the rest leaves the body as heat or motion.

"These various phenomena of protoplasm may be conveniently spoken of under the designation of so many 'properties,' or 'attributes,' or 'powers' of protoplasm, it being understood that these words are used in a general, and not in any definite, scholastic sense. Thus we may speak of protoplasm as having the power of *assimilation* [Professor Foster's italics], *i.e.*, of building up the dead food into its

living self; of *movement*, or of *contractility*, as it is called, *i.e.*, of changing its form through internal explosive changes; and of *irritability* or *sensitiveness*, *i.e.*, of responding to external changes by less massive internal explosions which, spreading through its mass, are not in themselves recognisable through visible changes, though they may initiate the larger visible changes of movement.

"These and other fundamental characters, all associated with the double upward and downward series of chemical changes, of constructive and destructive metabolism, *are present in protoplasm wherever found.*"

The wonder of all this is enough to take away one's breath. But there remains something infinitely more wonderful still. Not only does this microscopical mass of nucleated protoplasm possess the powers above-described, but it can "propagate" these powers. It can, out of itself, produce another existence like to itself, and yet absolutely different from itself. And this new existence possesses all the powers of that parent who produced it, and, strangest thing of all, the powers of that which produced it remain the same and undiminished. While communicating its powers, its powers have suffered no loss, but remain in all their fulness as before.

This special power of multiplying without loss is called the sexual power. It is said to work in two ways—the one consisting in the simple division of a nucleated mass of protoplasm; the other, in the union, or fusion, of two opposite masses of protoplasm, called respectively the male and the female element. The one way is called asexual, the other sexual.

The "matter of life" possessing these remarkable powers, and there being no known instance of "spontaneous generation"—that is, of living protoplasm coming into existence of itself out of inorganic matter, without the help of preceding living protoplasm, Mr. Huxley's act of philosophical faith seems difficult to understand.

We may now proceed to consider the reasons given by Mr. Huxley for that "faith."

At page 135, "Lay Sermons"—"Physical Basis of Life"—Mr. Huxley says:—

"Thus the 'matter of life,' so far as we know it (and we have no right to speculate on any other), breaks up, in consequence of that continual death which is the condition of its manifesting vitality, into carbonic acid, water, and ammonia, which certainly possess no properties but those of ordinary matter. And out of these same forms of ordinary matter, and from none which are simpler, the vegetable world builds up all the protoplasm which keeps the animal world a-going. *Plants are the accumulators of the power which animals distribute and disperse.*

"But it will be observed that the existence of the matter of life depends on the pre-existence of certain compounds; namely, carbonic acid, water, and ammonia. Withdraw any one of these three from the world, and all vital phenomena would come to an end. They are related to the protoplasm of the plant as the protoplasm of the plant is to that of the animal. Carbon, hydrogen, oxygen, and nitrogen are all lifeless bodies. Of these, carbon and oxygen unite, in certain proportions and under certain conditions, to give rise to carbonic acid; hydrogen and oxygen produce water; nitrogen and hydrogen give rise to ammonia. These new compounds, like the elementary bodies of which they are composed, are lifeless. But when they are brought together under certain conditions, they give rise to the still more complex body, protoplasm, and this protoplasm exhibits the phenomena of life.

"I see no 'break' in this series of steps in molecular complication, and I am unable to understand why the language which is applicable to any one term of the series may not be used to any of the others. We think fit to call different kinds of matter, carbon, oxygen, hydrogen, and nitrogen, and to speak of the various powers and activities of these substances as the '*properties*' *of the matter of which they are composed.*"

Quite true, only we are not at liberty to attribute to substances powers or activities or "properties" which they are not known to possess.

"When hydrogen and oxygen are mixed in a certain proportion, and *an electric spark is passed through them*, they disappear, and a quantity of water, equal in weight to the sum of their weights, appears in their place. There is not the slightest parity between the passive and active powers of the water and those of the oxygen and hydrogen which gave rise to it. At 32° Fahrenheit, and far below that temperature, oxygen and hydrogen are elastic gaseous bodies, whose particles tend to rush away from one another with great force. Water, at the same temperature, is a strong, though brittle, solid, whose particles tend to cohere into definite geometrical shapes, and sometimes build up frosty imitations of the most complex forms of vegetable life.

"Nevertheless we call these, and many other strange phenomena, *the properties of the water*, and we do not hesitate to believe that, in some way or another, they 'result' from the 'properties' of the component elements of the water. We do not assume that a something called 'aquosity' entered into and took possession of the oxide of hydrogen as soon as it was formed, and then guided the aqueous particles to their places in the facets of the crystal, or amongst the leaflets of the hoar-frost. On the contrary, we live in the hope and in the faith that, by the advance of molecular physics, we shall by-and-bye be able to see our way as clearly from the 'constituents' of water to the 'properties' of water, as we are now able to deduce the operations of a watch from the form of its parts and the manner in which they are put together.

"Is the case in any way changed when carbonic acid, and water, and ammonia disappear, and in their place, under the influence of pre-existing living protoplasm, an equivalent weight of the matter of life makes its appearance?"

Not in the least—*when you have the pre-existing living protoplasm!*

But such is not the problem we seek to solve—but the "*origin*" *of the indispensable protoplasm.* There is nothing to hinder our belief that the components of carbonic acid, and water, and ammonia always existed. But considering the delicacy of the substance we call "protoplasm," and the intense heat which once, and for—it may be millions of years—prevailed, it is impossible not to believe but that there *must* have been a time when it did not—because it could not—exist. How did it come to exist?

"It is true," continues Mr. Huxley, "that there is no sort of parity between the properties of the components and the properties of the resultant, but neither was there in the case of the water. It is also true that what I have spoken of as the 'influence of pre-existing living matter' is something quite unintelligible; but does anybody quite comprehend the *modus operandi* of an electric spark which traverses a mixture of oxygen and hydrogen?"

Certainly not, they are alike not "unintelligible," but alike "incomprehensible;" but it is not a *modus operandi,* but a *fact* we seek—the *origin of* "*protoplasm.*" Of the electric spark we know the origin.

"What justification is there, then, for the assumption of the existence in the living matter of a something which has no representative or correlative in the not-living matter which gave rise to it? What better philosophical status has 'vitality,' than 'aquosity?' And why should vitality hope for a better fate than the other 'itys' which have disappeared since Martinus Scriblerus accounted for the operation of the meat-jack by its inherent 'meat-roasting' quality, and scorned the 'materialism' of those who explained the turning of the spit by a certain mechanism worked by the draft of the chimney?

"If scientific language is to possess a definite and constant signification whenever it is employed, it seems to me that we

are logically bound to apply to the protoplasm, or physical basis of life, the same conceptions as those which are held to be legitimate elsewhere. If the phenomena exhibited by water are its 'properties,' so are those presented by protoplasm, living or dead, *its* 'properties.'

"If the properties of water may be said to result from the nature and disposition of its component molecules, I can find no intelligible ground for refusing to say that the properties of protoplasm result from the nature and disposition of *its* molecules.

"But I bid you beware that in accepting these conclusions you are placing your feet on the first rung of a ladder which, in most people's estimation, is the reverse of Jacob's, and leads to the antipodes of heaven. It may seem a small thing to admit that the dull vital actions of a fungus, or a foraminifer, are the properties of their protoplasm, *and are the direct results of the nature of the matter of which they are composed.* But if, as I have endeavoured to prove to you, their protoplasm is essentially identical with, and most readily converted into, that of any animal, I can discover no halting-place between the admission that such is the case, and the further conception *that all vital action may, with equal propriety, be said to be the result of the molecular forces of the protoplasm which displays it.* And if so, it must be true, in the same sense and to the same extent, that the thoughts to which I am now giving utterance, and your thoughts regarding them, are the expression of molecular changes in that matter of life which is the source of our other vital phenomena."

Mr. Huxley says:—"If the 'properties' of *water* may be properly said to result from the nature and disposition of its compound molecules, I can find no intelligible ground for refusing to say that the 'properties' of *protoplasm* result from the nature and disposition of *its* molecules."

I think we are bound to concede to Mr. Huxley that the properties of all things must be the result of the "*nature*"

and '*disposition*' of their molecules." By the "*nature*" of a thing being meant its *Powers*, its powers of action upon other things, and its powers of resistance—whether active or passive to the action of other things upon itself. But such a concession does not, I think, touch the problem sought to be solved. We have previously come to the conclusion that Matter and Force have eternally existed, and therefore have had no occasion to consider the "origin" of anything, whether of Matter or Force. But now, for the first time, there has arisen the *question* of a *real* "*origin*"—of a real "*beginning*." There was certainly a time when, for reasons already stated—what we know as living matter—which we call "protoplasm"—did not exist. It exists now. How are we to account for its existence? Mr. Huxley's opinion is, that, "living protoplasm" or the "matter of life" was originally "evolved" from "not living matter." But in the admitted "absence of evidence of spontaneous generation" he gives this, not as a "belief," but as an "act of philosophical faith." In order that we may be able to give our best judgment on so supremely important a subject, I have given Mr. Huxley's argument *in extenso*. We must now examine it in detail.

The not-living matters of which protoplasm, or the matter of life, consists are—I will quote Mr. Huxley's words—"Carbon, hydrogen, oxygen, and nitrogen, which are all lifeless bodies. Of these, carbon and oxygen unite, in certain proportions and under certain conditions, to give rise to 'carbonic acid;' hydrogen and oxygen produce 'water;' nitrogen and hydrogen give rise to 'ammonia.' These new compounds, like the elementary bodies of which they are composed, are lifeless. *But when they are brought together, under certain 'conditions,'* they give rise to the still more complex body 'protoplasm,' and this protoplasm exhibits the 'phenomena of life.'"

As the "condition" is the presence and action of *pre-existing* protoplasm, this does not in any way touch the

question of the *origin* of the "*First protoplasm*," but merely states the way in which "new" protoplasm *now* comes into existence: about which there is no dispute or doubt. We have studied Professor Foster's account of the processes of "metabolism," which has enabled us to understand how, by the action upon them of living protoplasm, the not-living carbonic acid, the water, and the ammonia have been converted into living protoplasm; and through that process have themselves acquired the powers or properties of—in their turn—elevating other not-living carbonic acid, water, and ammonia into living protoplasm.

Mr. Huxley proceeds:—

"I see no break in this series of steps in molecular complication, and I am unable to understand why the language which is applicable to any one term of the series may not be used to any of the others. We think fit to call different kinds of matter, carbon, oxygen, hydrogen, and nitrogen, and to speak of the various 'powers' and 'activities' of these substances as the 'properties' of the matter of which they are composed.

"When hydrogen and oxygen are mixed in a certain proportion, and *an electric spark is passed through them*, they disappear, and a quantity of 'water,' equal in weight to the sum of their weights, appears in their place. There is not the slightest parity between the passive and active powers of the water, and those of the oxygen and hydrogen which have given rise to it. At 32° Fahrenheit, and far below that temperature, oxygen and hydrogen are elastic gaseous bodies, whose particles tend to rush away from one another with great force. Water, at the same temperature is a strong, though brittle, solid, whose particles tend to cohere into definite geometrical shapes, and sometimes build up frosty imitations of the most complex forms of vegetable foliage.

"Nevertheless we call these, and many other strange phenomena, the 'properties' of the water, and we do not

hesitate to believe that, in some way or another, they 'result' from the properties of the water. We do not assume that a something called 'aquosity' entered into and took possession of the oxide of hydrogen as soon as it was formed, and then guided the aqueous particles to their places in the facets of the crystal, or amongst the leaflets of the hoar-frost. On the contrary, we live in the hope and in the faith, that, by the advance of molecular physics, we shall by-and-bye be able to see our way as clearly from the 'constituents' of water to the 'properties' of water, as we now are able to deduce the operations of a watch from the form of its parts and the manner in which it is put together.

"*Is the case in any way 'changed'* when carbonic acid, and water, and ammonia disappear, and in their place, under the influence of pre-existing living protoplasm, an equivalent weight of the water of life makes its appearance?"

Not changed in the least. To the carbonic acid, water, and ammonia, the "*pre-existing living protoplasm*" bears the same relation as the "*pre-existing electric spark*" bears to the oxygen and hydrogen.

The *action* of the "*pre-existing*" *electric spark* upon the oxygen and hydrogen produces water, with its "properties."

The *action* of the "*pre-existing living protoplasm*" upon the carbonic acid, water, and ammonia, produces the matter of life—protoplasm—with *its* "properties."

Now we *know* the "origin" of the "electric spark," for we can bring certain substances together and produce it.

We do *not know* the "origin" of "living protoplasm," for we cannot bring any substances whatever together and produce *it*.

To produce the electric spark, which is to produce the water, we do not need a "pre-existing" electric spark, for we can produce one ourselves.

To produce the protoplasm we *do* need "pre-existing" protoplasm, for we *cannot* produce it ourselves.

The pre-existing electric spark acting upon the hydrogen

and oxygen does not convert them into "electric sparks," but into a *different* thing; it converts them into "water."

The pre-existing living protoplasm acting upon the carbonic acid, the water, and the ammonia, converts them into a substance *identical with itself*—converts them into protoplasm, and to that protoplasm it has communicated all the "powers" which it itself possesses.

Two drops of water cannot unite to produce a third, and having done so, proceed to "assimilate" oxygen and hydrogen, so as to replace what they parted with to make the new drop of water, and to which they have imparted the same power.

The protoplasm can do all this, and can effect it in two ways: a speck of it can divide itself into two; or two specks can unite into one; and the result may be a single third individual, or a number of new individuals, each of which possesses all the powers or properties possessed by the parents.

The power possessed by the produced protoplasm—or any power resembling it—is not possessed by the produced water.

What is Life then? Is it a Force—or what?

We have seen that "Force" is destructible. We have seen that one body possessing force at a given moment cannot communicate force to another body without its own force being diminished to the extent of what it has communicated. A moving billiard ball striking another billiard ball at rest, causes it to move, but the velocity of the two balls is only equal to half the velocity of the first ball before its collision with the second ball, and the force of both is eventually destroyed by friction, gravity, etc. In the process of that destruction the destroyed force of the two moving balls destroys an equal amount of force in that, or those, which destroyed *their* force. It is not so with "*power*," the "action" of which is "force." Power in the inorganic is indestructible and *incommunicable*—at least, so far as we

know. An atom cannot be "deprived" of its gravific power, its cohesive powers, its powers of chemical and other attractions and repulsions, neither can it "communicate" to any other atom any of these powers. We cannot but think that exactly what the "powers" of each atom were a hundred million years ago, such they are now. But power, such as we know it, in the inorganic cannot communicate *power*, it can only communicate *force*, and that force is *destructible*.

As Life can communicate force, we are compelled to think—to believe—that it is a "Power." But in that belief we cannot rest. It is not only a Power, but it is *more* than what we understand by that term. All other powers can produce—can communicate—force only. *But the unique, the marvellous power we call Life can not only communicate force, but can communicate "Power," and it can also communicate the power to communicate power, and so stands alone.* It dominates, it commands, it compels, all other powers and all other forces to its will—to its need. It is the master, the lord, the king of the physical universe.

Can we even *suppose* it is to be the outcome of any combination of physical powers and forces? I find it impossible to do so.

Professor Michael Foster has set forth some of the wonders of an amœba. His work being on physiology he could only incidently refer to the miracles of sensation, of memory, of imagination, of thought, rudimentary in that "jelly-speck" called the human ovum. Can we suppose that any combination of physical matter could produce such marvels? It is not surprising that the assertion that life and consciousness could so originate "should be unsupported by any satisfactory evidence," and that our most eminent scientists find it impossible to "believe" in "spontaneous generation."

We have, hitherto, found it impossible to accept Dr. Flint's postulate that "Nature is but the name for an effect whose cause is God," because Dr. Flint failed to set before

us any "beginning" of anything whatever, so that no "Creator" was *needed;* for Matter and Force seemed adequate to account for all phenomena without exception, for all phenomena resolved themselves into changes of arrangement and of action of eternally-existent Matter and Force. Can we continue to adhere to that belief? or have we stumbled on something for which no combinations of Matter and Force are able to account; or something which *must* have had a "beginning," but which certainly could not begin itself? If Nature—and by Nature, I mean the total sum of all inorganic Matter and Force—if Nature has not, and cannot, so far as we can see, by any arrangement or action of the Matter and Force which constitute it—"it," not "his"—not "her"—*for there is no "sex" in "physics"*—have given rise to, or produced, or originated, or evolved that "power," which, when "en-mattered," we call "protoplasm," and which possesses *that* which expresses itself in the phenomena of "Life."

What, then, has given rise to Life? If inorganic nature could not, there must nevertheless be "something" which could, and has given rise to it; for Life exists. That it has not eternally existed we know, for we know that there was a time when it could not exist. That which has eternally existed has not been caused—does not need to be accounted for. But Life had a beginning, and therefore had a cause —a Creational Causer. What can we say of that "Cause?" What can we think of it?

We cannot but think of it as being sufficiently powerful —and that it had such perfect knowledge of and mastery of the powers and modes of action of the matters and forces which constitute inorganic nature, as to adapt life to the circumstances and conditions amidst which the new power was to exist and act; and that this new power was so constituted—that though it seemed so weak, so ill-fitted, to maintain itself in the midst of the struggle and crash of the inorganic forces acting upon and surrounding it—think of

the first speck of protoplasm—it, nevertheless, could and did survive; and not only survived, but was able so to develop the possibilities present in it as to gradually—though by steps infinitely slow, sometimes so slow as to seem altogether to cease—increase its mastery of all other powers and their forces, and to make them more and more subservient to its needs and its desires. That the amœba, in fact, should eventually develop into the man.

CHAPTER XX.

THAT LIFE WAS NOT EVOLVED, BUT CREATED. THAT INORGANIC NATURE WAS ALSO CREATED.

BEING unable to discover anything that would warrant us in concluding that the Power Life has been "evolved,"—has resulted from any combination of other powers, we cannot but think of it as having been created by some Being possessing the power of "*creational*" *causation*. We cannot think that creational act to consist of creating the power Life "out of nothing," as if "nothing" was a something that could be fashioned into something else. The *how* of creation is incomprehensible; but, I think, the result of our study of the origin of Life leaves us no choice but to believe in the *fact* of "creation," and, consequently, to believe in the existence of some Being possessing the power to create—to cause to be.

Life is, therefore, not "natural"—does not come from inorganic nature—it is *super*-natural. But it is not "contrary" to nature—to inorganic nature. Inorganic nature is the sum of powers constituting the total of the groups of powers which we call atoms. It is an "addition" to the powers of Nature. It is *plus* Nature, *above* Nature, not *contrary* to it.

Life does not break the "continuity" of Nature—does not break the "uniformity" of Nature. For what does the phrase "the uniformity of Nature" mean? It simply means that a weaker force shall always be conquered by a force which is stronger: a law which holds good in the presence of Life, just as it does in its absence. The sum of the powers which constitute Nature remain identically what they always were. The only difference made is, that *a new power has*

made its appearance, and which like all the other powers, manifests itself by the force it displays; its forces, in many cases, dominating the other forces. The action of the powers of Nature remain the same, but they do not produce the same results as they did while the life-power was, as yet, not present. Carbon, whether it presents itself to us as a diamond, or a piece of black-lead, or a fragment of coke, or in a vegetable or animal tissue, is never more and never less than a group of elemental atoms; for inorganic matter never lives at all. It merely has or has had Life present in it. The only difference between unorganised and organised matter is, that organised matter, or matter in process of being organised, exhibits either the past or present effects upon it of the power Life. There is no "organic" matter, the word is a misnomer; but there is "organised" matter—there is "unorganised" matter.

We cannot help thinking that the Creational Causer is a Being who intends, who purposes, who designs; for we can hardly think Life was created without the Creator having some *reason* for creating it.

It is a delightfully easy way of accounting for things to make them account for themselves, by saying, they always existed, and that the interactions of Matter and Force account for all phenomena. The recognition that they will not do so, gives rise to all sorts of questions—questions so puzzling, that man, being essentially a lazy animal, almost wishes he could have retained that easy state of mind which believes in the eternity of Matter and Force, and their competency to account for anything. But man, though lazy, has an unquenchable thirst for knowledge, which gets the better of his indolence, which spurs him on to labour in its pursuit, and develops in him that "passionable patience" without which he can make but little progress.

Life, having survived the risks and chances and dangers which, considering the delicacy of its constitution and the perils which environed it, is, to say the least, very remark-

able, has been able to develop itself from amœba to man; and we cannot help thinking that the Creator must have intended such development, and to have so constituted the primal protoplasm, and to have so timed its creation, as to make that development possible; and also to have perfectly known, not only what had been the previous history of Matter and Force, but also what would be their history in the future. Of course, given the nature and amounts and relations of Matter and Force, and given the nature of Life, it could not but be that their history should result in the state of Matter and Force, and in the state of Life, as they exist at the present moment. But we can well imagine that if Life had been created sooner than it was, or created later than it was, it might have been impossible for it to survive up to the present time. We can also well believe that a Being capable of creating Life would not create it without reference to its future—without design, without intention, without purpose.

Which gives rise to a further question:—

Until we were called upon to account for the beginning of Life, we had knowledge only of "changal" causation—that is, the effects of the overcoming of weaker by stronger force. We had no knowledge of "creational" causation—that is, the causing of something to begin to be.

We have seen that Life "began" to be. We have seen that although in its physical aspect it is a weak power, yet we have seen that in virtue of its being a power of a nature different from and superior to the powers of physical nature, and possessing the ability to *so arrange oppositions of physical Forces to one another that the result shall be what it desires*—as in the cases, say, of a great ocean steamer crossing the Atlantic from Liverpool to New York in spite of an opposing tempest; or of making a hole through the side of a ship defended by plates of iron sixteen inches thick, by means of a shell projected from the mouth of a "Woolwich Infant." The sum of inorganic Matter and Force, tremendous though

it may be, has—except in so far as it ministers directly or indirectly to the needs or desires or development of living creatures—no value whatever. There is no "reason" for its existence. The power Life then being so infinitely superior to all that is without Life, suggests the question—Inorganic Matter and Force being so valueless in themselves, but deriving such value as they possess from ministering to the "uses" of "Life," does it not seem likely that they may have not *eternally* and uselessly existed, but that *they* also may have been "created"—created by the same Being who "created" Life,—may have been created solely for the *purpose* of ministering—or being of *use* to the power Life, and in order to furnish fitting conditions for the long course of its development from the primeval "jelly-speck" to man?

It seems to me that as inorganic nature appears to have no *reason* for its existence, apart from its relation to living creatures, the inference that *it* also was created by the same Being as created Life is unavoidable, and as such, must, I think, be accepted.

Like Life, the "nebulosity" out of which our solar system has been developed was "created,"—created by the same Being who created Life.

CHAPTER XXI.

SIMILAR SUBSTANCES PRESENT IN THE EARTH, THE SUN THE STARS, AND THE NEBULÆ. INFERENCE THAT THEY HAD A SIMILAR ORIGIN.

COMMUNITY OF SUBSTANCE IN THE EARTH AND IN THE SUN—INFERENCE THAT THEY HAD A SIMILAR ORIGIN—THE "PRIMITIVE NEBULOSITY" OUT OF WHICH THE SOLAR SYSTEM WAS DEVELOPED MUST HAVE BEEN CREATED—HOW DID THE STARS COME TO BE?—SIR HENRY ROSCOE ON "STELLAR CHEMISTRY"—WONDERS OF SPECTRUM ANALYSIS—PROFESSOR G. G. STOKES ON "SIMILARITY OF PLAN" WITH "INDIVIDUAL DIFFERENCES" BETWEEN THE FIXED STARS AND THE SUN.

But there are other "natures," other "suns," than ours. Other suns, so immensely greater, that compared with some of them ours seems but an insignificant speck; and around which, though invisible to us, may revolve bodies bearing the same relation to these "greater" suns as the earth and the other planets bear to ours. How do *they* came to be?

In order to be able to answer that question it will be necessary to consider the constitution of the earth, and also that of the sun.

Our earth is composed, so far as we know, of about seventy different kinds of atoms. It is one of a certain number of bodies revolving round the central body we call the sun, and which together constitute the "solar system."

We know, by means of spectrum analysis, that the sun contains many substances similar to those of which the earth is composed. Speaking of the dark lines in the solar spectrum, Sir Henry Roscoe, in his "Lessons on Elementary Chemistry," says, at page 240:—"These dark lines are caused by the passage of white light through the glowing vapours of the metals in question, present in the sun's

atmosphere, and these vapours absorb exactly the same kind of light which they are able to emit. The sun's atmosphere therefore contains these metals in the condition of glowing gases, the white light proceeding from the solid or liquid strongly-heated mass of the sun which lies in the interior. By observing the coincidences of these dark lines with the bright lines of terrestrial metals, we arrive at a knowledge of the occurrence of such metals in the solar atmosphere with as great a degree of certainty as we are able to attain to in any question of physical science. The metals hitherto detected in the sun's atmosphere are seventeen in number, viz., iron, sodium, potassium, magnesium, calcium, chromium, nickel, barium, copper, zinc, strontium, cadmium, cobalt, manganese, aluminium, lead, titanium. Hydrogen and oxygen are also known to exist in the sun. The former element is found to exist in large quantity surrounding the luminous portions of the sun's body as a zone of incandescent gas, termed the solar *chromosphere*, whilst masses of ignited hydrogen thrown still higher from the red protuberances seen during a total eclipse. The rapidity with which the ignited hydrogen moves on the sun's surface is enormous. Solar cyclones or circular storms have been shown by Lockyer to blow with a velocity compared with which our most violent tornadoes are mere summer breezes."

There is thus a *community* of *substances* between the earth and the sun, indicating a *similar* "*composition*" and "*origin*." We cannot, I think, doubt that if the temperature of the sun were as low as that of the earth; the number of substances identical with those of which the earth is composed would be much greater. If we could command a heat as intense as that which is present in the sun, we should doubtless be able to decompose many of our so-called elements, and so reduce their number to that which Sir Henry Roscoe states to be present in the sun.

If the temperature of the earth were so reduced that water could be known only in the state of crystallisation or

ice; then, supposing human beings were capable of existing under such circumstances, they would consider ice as an "elementary" body. On the other hand, if man could exist in the midst of the intense heat present in the sun, his list of elementary bodies would be reduced to the number given by Sir Henry Roscoe. Having, for the reasons already stated, been compelled to believe that Life was a "creation" and not an "evolution," I find myself also compelled to believe that the primitive nebulosity, out of which what we call the solar system has been developed, was also created—created by the same Being who created Life, and that it was created for the use of Life.

But the stars also exist. How did *they* come to "be?" Of what materials are *they* composed? Did the materials of which they are composed exist from eternity, or, like the "primitive *nebulosity*" out of which our solar system has been developed—were they created?

Of "stellar" chemistry, Sir Henry Roscoe says, at page 241:—

"The same methods of observation and reasoning apply to the determination of the chemical constitution of the fixed stars, which are 'self-luminous' suns; but the experimental difficulties are greater, and the results, therefore, are as yet *less complete, though not less conclusive*, than in the case of our sun.

"The spectra of the stars all contain dark lines, but these are for the most part different from the solar lines, and differ from one another; hence we conclude that the chemical constitution of the solar and stellar atmospheres is different. *Many of the substances known in this earth have been detected in the atmosphere of the stars.* We owe this most important discovery to Dr. Huggins and Professor W. A. Miller. Thus the star called 'Aldebaran' contains hydrogen, sodium, magnesium, calcium, iron, tellurium, antimony, bismuth, and mercury; whilst in 'Sirius' only sodium, magnesium, and hydrogen have with certainty been detected."

That so much should have been detected may surely be said to be one of the greatest marvels of science. Considering that light travels at the rate of 186,000 miles per second, and that a ray of light leaving "Sirius"—which is the nearest (!) of the fixed stars—takes about three years and a half to reach the earth, it is indeed a "marvel" that we should be able to gain any knowledge whatever of the materials of which it is composed. *These materials*, so far as science has been able to ascertain, are *the same as exist in the sun and its planets*. Were the stars then "*created*" *also?* and were they created by the *same Being* as created the sun, and the earth, and Life? It would certainly seem so.

Professor G. G. Stokes, in his recently published "Burnett Lectures on Light," says (part ii., page 63):—

"The general result (of investigations as to the chemical constitution of stars) tends to establish a *similarity of plan*, combined with *individual differences*, between the different *fixed stars*, and between *them and our own sun*." Professor Stokes further says:—

"We can hardly avoid surmising that these distant suns may, like our own sun, be accompanied by planets circulating around them, and that these planets again, or such of them as may be habitable, are, like our own, tenanted by living beings, it may be by rational beings of some kind."

CHAPTER XXII.

WHAT CONSTITUTES A STAR OR SUN? WHAT ARE THE SOURCES OF THE HEAT OF THE SUN? WHY ARE THEY INEXHAUSTIBLE?

WHAT IS A SUN?—A SUN IS A BODY WHICH CANNOT BECOME COLD—INDESTRUCTIBLE INTERNAL CAUSES OF HEAT—IN CHEMICAL ACTION AND IN COHESIVE UNION OR SEPARATION AND OTHER ACTIONS HEAT IS NOT "SET FREE" OR "LIBERATED," BUT GENERATED—THE SOURCE OF HEAT IS IMPEDED MOTION OR FORCE—CAUSES OF DISSOCIATION OR OF SEPARATION—HOW THE SUN'S HEAT IS PRODUCED AND WHY IT IS INEXHAUSTIBLE—OF WHAT ARE THE NEBULÆ COMPOSED?—OPINION OF PROFESSOR G. G. STOKES.

STARS are suns. What is a "sun?" What is the special distinction which constitutes a sun?

The answer to which is, I think,—that a "sun" is a body which cannot cool beyond a certain point—cannot become "cold," because it contains within itself inexhaustible sources of heat; because it is a "perfect engine;" because it is a "perpetual motion."

Omitting the trifling amounts of heat caused by the falling in of meteoric bodies, the great causes of astral or solar heat are chemical "unions" and "separations"—the attraction of cohesion, elasticity, polarity, and the results of their actions and interactions, and gravity—gravity being more powerful than all the other powers united. If, in a given body, gravity be not more powerful than chemical "unions" and separations, and cohesions, etc., such body must, unless its temperature be maintained from some external source, become in process of time absolutely cold.

When chemical action takes place it does not "liberate" or "set free" some imaginary "locked-up" or "latent"

"heat"—for there is no such thing—but "generates" it—"produces" it.

It seems to me that there is only one single *source* of Heat, which is *impeded motion*, or, more properly, impeded *Force*. When a motion or Force does not, when "impeded," produce motion in that which impedes it, it does not produce "*Heat*," but only "*pressure*." *Without motion there can be no heat.*

When atoms, or particles, or molecules "combine," it is because there is present in them a "power" we call chemical attraction, and which is immensely "power"-ful. When mutually attractive substances come—no matter from what cause—within the range of such mutual attraction, they rush across the distance between them, the result being a powerful impact, the result of which is the impediment of their motion or force, the result of which is—Heat; which continues to be generated till the vibrations caused by their impact comes to an end. What *further* takes place I cannot say, more than that whatever may be the state of the combined substances it cannot be a state of impeded "motion," for if it were, it would manifest itself as—Heat, and it does *not* so manifest itself. Now no chemical action can "start" itself. It must be "started" by some force external to itself.

When chemical separation occurs, the cause is, either some more powerful external attraction being brought to bear, which causes what appears to be repulsion, or is in reality "repulsion," or the action of an amount of heat sufficiently powerful to overcome the attraction which holds the combined substances in the state of union.

In the former case, heat is generated in the overcoming of the attraction of the substances for each other, the heat manifested was not "latent"—"locked up"—"set free"—but is then and there generated, and results—as it does in all cases—from "impeded" "motion," which may be expressed in the formula that both in chemical union and in chemical dissociation heat is generated, which may help us to under-

stand how it is that the sun's heat is self-caused and inexhaustible.

Gravity attracts all the particles of a body towards its centre. Let us think of that particular body—the sun, and what we shall say of the sun applies to other suns or stars. Let us suppose all the particles constituting the total substance of the sun to be, at a given moment, in a state of chemical and mechanical equilibrium; and let gravity be supposed to be suspended, and the sun absolutely cold.

Let us suppose the earth to be in the same state as the sun, all its particles in chemical and mechanical equilibrium, gravity suspended, and itself absolutely cold.

Let us suppose a third body of an indefinite magnitude—less than the sun, but bigger than the earth; its particles also in chemical and mechanical equilibrium, gravity sus- and pended, itself absolutely cold.

Let us suppose the action of gravity to recommence at the same moment in all the three bodies.

What would happen?

In the case of the earth we know what would happen. We know that whatever frictional heat may be produced by its contracting through the action of gravity, that heat is not sufficient to cause any visible change at its surface; unless we consider any volcanic action may be so caused. If contraction, caused by the resumption of the action of gravity, produced such an amount of heat as to *dissociate* some of the chemical substances in equilibrium, there would be heat and internal change to that extent; unless the dissociation was sufficient to cause either earthquake or volcanic eruption, there would be no visible change.

There would be pressure, of course; but pressure which does not produce "motion" cannot produce heat, for heat is caused by "impeded" motion. To produce heat there must must be either collision or friction. In the case of the earth, if the recommenced action of gravity did not produce

either, there would be no change beyond or other than pressure, and the earth would remain absolutely cold.

In the case of the sun what would happen?

The sun's gravity being twenty-seven and a half times as great as that of the earth, I think the friction of the particles against each other, caused by the resumed contracting action of gravity, would give rise to such an amount of frictional heat as would cause chemical dissociation; there would be a general explosion, and in a short time the sun would be in a state similar to that in which it was previous to the state of chemical and mechanical equilibrium and suspended action of gravity we have supposed. It would be in the same state as it is in now, the same causes would produce the same effects.

In the case of the third body what would happen?

That depends upon its magnitude and density. If it were of magnitude so great that the resumption of the action in it of gravity would by contraction produce sufficient heat to effect chemical dissociation, it would present phenomena similar in kind, but not equal in amount, to those presented by the sun.

If it were so small that the friction produced by gravitational contraction was insufficient to cause chemical dissociation, there would be the same absence of phenomena as in the case of the earth.

If my idea be correct, a "sun" is a body composed of such materials and of such magnitude that the sum of chemic and other force being weaker than the sum of gravific force, chemic and mechanical union cannot be permanently maintained. Bodies chemically uniting, generate, by their collision, heat equal to that which will be required to forcibly separate them. The frictional action of gravity generates the amount of heat needed to overcome the action of the forces which resist separation; in other words, to cause "dissociation." Thus, there is a continuous oscillation between union and disunion, which can never come to an

end, unless the solar mass shall, by some means or other, be so reduced that its gravitational action will not be able to produce such an amount of heat as shall produce chemical dissociation.

If our sun be of that magnitude which renders cooling beyond its present point impossible, then the earth, seeing it will always receive heat from the sun, can never so far cool as to become that frozen, useless ball which some scientists seem to think will be its inevitable fate.

If the gravific force of a body be insufficient to produce—by the friction of its substance in contracting—an amount of heat which shall cause chemical dissociation, and consequently the undoing of the work of contraction, that body, unless supplied with heat from some external source, *must* sooner or later become cold, as the moon has become cold.

If, on the contrary, its gravific force is sufficient to produce a certain amount of chemical dissociation, then that body can *never* become cold, for its sources of light and heat exist in itself.

But it may be asked—how does "association" take place?

Supposing, for convenience, that space is absolutely cold, and recognising that heat takes the line of least resistance to itself, it follows that heat, as fast as it is generated in the sun, radiates itself into the cold space.

The "dissociation" of chemically combined and cohesionally united substances in the sun, through the immense heat generated by the frictional action of the tremendous contractive action of gravity, causes explosions, by means of which the dissociated chemical substances are projected far into cold space—sometimes to the distance of hundreds of thousands of miles—where they are condensed by the cold. Thus, re-combination becomes possible, and takes place. The newly combined substances being of greater density than when in their dissociated state, fall back into the sun, and remain combined until by the gravitationally produced heat the same process is repeated, and with the same results; the

keeping up of the supply of heat, and which, I think, enables us to understand how it is that the sun has within itself powers which by their action continuously produce heat, and which being inexhaustible,—for no atom can be deprived of any of its powers, will continue for ever to produce it,—unless the Being who caused them to *be* shall cause them to *cease* to be. Chemical affinities, etc., are continually causing unions. Gravity, being stronger than all the other powers united, continually causes separations. What chemical affinity and the other powers do, gravity continually undoes. Chemical affinity, etc., and gravity, thus act as a "perfect engine"—as a "perpetual motion."

But besides suns and planets there are other bodies—viz., nebulæ. Of what are *they* composed? Are they of similar composition to the earth, the sun, and the stars, or are they different?

I refer again to Professor Stokes' recent work.

At page 66, part ii., Professor Stokes writes, referring to a paper by Dr. Huggins in the "Philosophical Transactions, for 1864":—

"In this he [Dr. Huggins] relates how, on turning the Royal Society's telescope which was entrusted to him, to one of the planetary nebulæ, he was surprised by finding its spectrum to consist of three isolated bright lines, of which the first coincided in position with a line of nitrogen, the third with the line F of hydrogen, while the intermediate line did not agree with that of any known element, though it lay near a line of barium. A number of nebulæ to which the instrument was directed showed the very same spectrum, except that the more refrangible and fainter of these lines were frequently invisible, while on the other hand, in one case, a fourth, more refrangible line, was faintly seen, which coincided with the line of hydrogen near G. These nebulæ frequently contained *stellar points*, corresponding to which was a narrow continuous spectrum, interrupted probably by dark lines which there was hardly light enough to see.

"Now, as it is only when matter is in the state of gas, or vapour, that when rendered glowing it gives out a spectrum with isolated bright lines, we have a right to conclude that these nebulæ—making abstraction of the 'stellar points'—consist of glowing gas."

But what is the gas?

Dr. Huggins reasons out the matter, and comes to the conclusion that the gas consists of hydrogen and nitrogen, but the other line remains unaccounted for. It may possibly indicate some form of matter more elementary than any we know on earth.

Our enquiries whether the Sun, the Stars, and the Nebulæ were composed of substances identical with, or at least similar to those of which the earth is composed, must, I think, be answered in the affirmative.

While making these enquiries we have noticed a remarkable fact, which is, that starting with the Earth we find that as the temperature of the bodies considered *increases*, the number of substances of which they are composed *decreases*. In the "earth" we have seventy substances. In the sun about twenty-two. The number known has since been increased.

I again quote the words of Professor Stokes:—

"The general result tends to establish a similarity of plan combined with individual differences between the different fixed stars, and between them and our own sun."

Our conclusion that Vitality can only be accounted for by "creational causation" leads to the further conclusion that not only Life, but all inorganic things—bodies—planets—suns—stars—nebulæ—have alike been "created," and created by the same Being who created Life.

And the Creator?

CHAPTER XXIII.

THE FINAL PROBLEM.

WE were unable to accept Dr. Flint's postulate, "That Nature is but the name for an effect whose cause is God," because he could give us no instance of creation. Consequently the question of a Creator could not be raised. It seemed that Matter and Force were adequate to account for all the phenomena presented in experience.

We were unable to accept Mr. Spencer's "single" Absolute Force, of which all things were affirmed to be "manifestations"—man himself necessarily included; because he failed to prove the existence of any Absolute whatever, whether of Force or otherwise; and because our experience of phenomena is, that they are not produced by any one Power or Force, but by several. If Mr. Spencer had succeeded in proving the existence of the Absolute Force, the result would simply have been a reassertion of the old doctrine of Pantheism, which, I think, is clearly the doctrine of Mr. Spencer—a doctrine which is unsupported by any—even the slightest evidence. It is a mere speculation, wholly destitute, either of scientific or philosophical proof, and is contradicted by the consciousness of every man—a doctrine which could have arisen only in the absence of scientific knowledge.

It seems to me that in speculating on and seeking for knowledge of the nature of things and how they come to be, two suppositions alone are tenable. The one, that they

always existed, and that all phenomena are merely changes of action and arrangements of eternally existing Matters and Forces—which I would call "Pan-ism," and which need neither "Theos" nor "Pan-theos;" the other, that there is only *one* "Eternal" Existence, and that all other existences were created by that one existence; which is the doctrine of "Theism."

Mr. Tyndall and Mr. Huxley, as we have seen, hold the former—but hold it with a reservation. They are unable positively to assert that Life or vitality is the outcome of Matter and Force alone. Mr. Tyndall believes that Life *is* the production of Matter and Force, but is unable to see how Matter and Force could give rise to "consciousness." Mr. Huxley holds the production of Life from Matter and Force, not as a belief, but as an "act of philosophical faith."

I have placed before the reader my reasons for believing Life to have been, not an "evolution" of existing Matter and Force, but a "creation." That belief has led to the further belief, that all which we call Matter and Force—or rather, Powers, of which Forces are the action—were also created.

If we suppose *all* things to have been "*created*," then there must have been a time when there was nothing but the Creator. What kind of conception can we form of that Creator? Can we form any conception at all? We have seen the conclusions arrived at by Mr. Mansel and Sir William Hamilton. We have seen the conclusion reached by Mr. Spencer. Their conclusions are not very encouraging; nevertheless, we will not allow ourselves to be deterred from considering the subject to the best of our ability.

The "Panist" and the "Theist" alike are compelled to believe in "Infinity."

The "Panist," unable to believe the universe to be limited, thinks that "Infinity" consists of Matter and Force and Space. That sometimes there is Matter, sometimes there is Force, and sometimes there is Space; but that there is always

and for ever, one or other of these. And he believes that these eternally existed.

The "Theist" believes in the existence of Matter and Force; but he also believes that they did not eternally exist, but owe their existence to an Infinite Creator, who caused them to be. Consequently he believes that there was a time when the Creator was the sole existence. But he also believes, that although the Creator was necessarily Infinite before he created, He yet was able to create or cause to exist other substances, and that the universe, as we know it, is the result of that creative action.

To this the Panist objects, on the ground of its impossibility. He says, "If the Creator, before he created, was 'necessarily' Infinite—that is, unlimited—that is, left no place where he was not; how could he possibly *add* anything to what was already without bounds? How could 'room' be found for an "addition" to *that* to which, being Infinite, addition was impossible—inconceivable? The only conceivable way in which creation could be effected would be, that the Creator should annihilate such a portion of himself as would enable him to make 'room' for that which he created, by which act he would cease to be Infinite, for there would be a 'where' where he was not, 'a something' which he was not; and instead of the Infinite there would be two (or more) finites which mutually limited each other—there would be the Panist's 'Infinity,' not the Theist's '*the* Infinite.' The Infinite would, indeed, be the 'First Cause,' but in becoming the First Cause he would cease to be 'Infinite.'"

The "Pan"-"theist," like the Panist and the Theist, cannot avoid belief in either *the* Infinite or in Infinity consisting of Matter, Force, and Space combined—but he endeavours to escape the dilemma indicated above by dispensing with "creation" altogether. He says, "What the Theist calls 'creation' is not creation at all. That which is so called, is simply the 'action' of the One Infinite Absolute Being. It is, as one may say, merely a 're-arrangement'—a 're-

distribution' of the 'substance' of the Infinite Absolute Being, not a 'creation;' and that all phenomena are—as Mr. Spencer says—'manifestations' of the 'unknowable.'"

This explanation looks, at first sight, sufficiently plausible. Examination, however, shows it to be entirely futile. It "assumes" the existence of an Infinite "unity," or "Absolute," or "unknowable," of which all that the Theist calls creation, the Pantheist and Mr. Spencer call "manifestations." But if the *existence* of that Infinite unity it offers absolutely no proofs. "Experience," inasmuch as it is obliged to ascribe various phenomena, not to *one* cause, but to *various* causes, denies Pantheism. In fact, so far from science being able to attribute all effects to *one* cause, it finds it impossible to account for the phenomenon of life by *any* or *all* of the causes known to it. Consciousness absolutely contradicts it. Pan-theos means "God is all things, and all things are God." "Pan"-"Theos," then, is Infinite. Pan-theos must be conscious—must know what it does. If it *does* everything, and *is* everything, then everything—that is, Pan-theos—must know what "everything" does. "*I*" am a "manifestation"—that is, an "act" of Pan-theos. Pan-theos must know all things at the same time. It is not more present, more conscious in one act than in another. It must be alike present in all acts. Can we suppose one part of Pan-theos does not know what every other part of Pan-theos is doing? If it were so, then Pan-theos could not be Infinite—certainly could not have infinite knowledge. Such being, as it seems to me, necessarily the case, why do "*I*" not feel—feel, nay *know*, "myself" to be God? Why do I not know, not only what I am doing, while I sit at this table thinking these thoughts and writing these words, but also what I am doing throughout all infinity? Whereas, that which I know as "absolute" knowledge is, that I am *myself alone*—a fact which expresses itself by the universal division by all conscious creatures of the total of things into self and not-self, me and not-me. Whatever Theism may

be, Pantheism is a baseless assumption contradicted by all experience and unsupported by any evidence whatever. It is a mere philosophical figment.

"Panism" being unable to account for the appearance of Life, necessitates the supposition of creation. "Creation" necessitates a Creator, and leads, eventually, to the conclusion that the Creator must be Infinite.

But the idea of creation must be erroneous, or must lead to the further conclusion that the Creator being "Infinite" can only make "room" for that which he creates by annihilating a part of himself, and in place of that part, substituting that which he creates; and so, by the first act of "creational causation" ceasing to be Infinite, though himself and what he creates, *together* constitute "Infinity." But the destruction of a portion of the Infinite for the sake of creating something else which must necessarily be *inferior* to that which has been destroyed to make room for it, we cannot help considering to be wholly inadmissible. But how *can* we conceive an "*addition*" to the "*Infinite?*" To do so seems impossible.

Let us, as far as we can, distinctly understand our present position. On the one hand we seem to be compelled to believe that the universe was created,—that is, that there was a time when it did not exist—that is, that it had a "beginning." On the other hand, we seem compelled to believe that *before* that "beginning," there was an existence, or Being, who was "Infinite" and "Absolute;" and that the universe was created or caused to be by that Being. We feel equally obliged to believe that both these statements are true.

But these statements seem as if they could not by any possibility *both* be true. They imply, not merely an incomprehensibility—of which we should think little, all things teem with incomprehensibilities—but a contradiction, and *two things which contradict one another cannot both be true.* One of them may be true, but that both should be true is impossible.

But if we believe that both statements *are* true, then our so believing must necessarily imply that we also believe that the contradiction is only seeming, not real. Can evidence warranting that last stated belief be found?

Let us begin with what we "know," or "suppose" we know.

We are supposed to know what we mean by the "universe." I am not, however, quite so sure that we do.

At any rate, we know what we mean by "Finites"—the abstract word, "the Finite," cannot, properly be used here. By a "finite," we mean something which has dimensions—that is, length, breadth, and thickness; such being the names of its limits, or where its substance ends or ceases. A "limit" means that in a particular direction a particular body ends or ceases; there is no more of it.

It is generally supposed that one body is "limited" by other bodies which surround it. This is, I think, a mistake. Suppose a body to be a cubic inch square. Suppose it to be surrounded by similar bodies, which on all its sides are in contact with it. The first body would be said to be limited by those bodies surrounding it. Not in the least. Suppose all the bodies to be in vacuo. Remove all the other bodies from contact with the first body. Would there be any difference in the limits,—that is, the "size," of that first body? None whatever. It would be exactly the same size as it was before—that is, its limits would not in any way be altered. *That which limits a body, is, that there is no more of it.* The limits of a body are determined by its "quantity." Of course the *form* of those limits may be affected by bodies surrounding it. The "finity" of the body is determined by its "quantity."

The universe is a name for the total sum of existing quantities—suns, planets, nebulæ, etc.

No doubt the "universe" includes all so-named quantities. Does it include anything more? Does it also include "Space?"

I believe the suns, planets, nebulæ, etc., to have been "created." Was "Space" also "created?" and, is Space a "Finite," or is it "Infinite?" or, perhaps we had better say, "Un-finite." Do things exist in it as we supposed the half-dozen fishes to exist in the third glass cube, when there was water in every part of it, whether there were fishes or not?

Let us go "back" as far as we possibly can.

We can "suppose" the non-existence of all matter. But we cannot "suppose" the non-existence of Space—or of any part of it. Consequently we cannot suppose it can have had a "beginning," or that it can ever have an "end." The only "entity" then, with which we propose at present to deal, is *Space*. Can consideration of Space help us to any conception of the Infinite?

Let us now endeavour to get a clear idea of what is "meant" by "Infinite" and "Absolute."

At page 30 of "The Limits of Religious Thought," Dr. Mansel writes thus:—

"There are three terms—familiar as household words in the vocabulary of philosophy—which must be taken into account in every system of metaphysical theology. To conceive the Deity as he is, we must conceive him as First Cause, as Absolute, and as Infinite. By the *First Cause* is meant that which produces all things, and is itself produced of none. By the *Absolute* is meant that which exists in and by itself, having no necessary relation to any other Being. By the *Infinite* is meant that which is free from all possible limitation; that, than which a greater is inconceivable; and which consequently can receive no additional attribute or mode of existence which it had not from all eternity."

The "First Cause" does not enter into the idea of the Absolute and the Infinite, at present at any rate. Before the Infinite and Absolute can be considered as "Cause," its "existence" must be established. To establish such existence will cost no trouble at all. It lies directly before our eyes,

in the form of "Space;" for it is impossible to conceive Space as being "limited"—that is, as ending anywhere, or in any direction; or beginning to exist, or ceasing to exist, anywhere or in any direction. We are *compelled* to think of it as "Infinite."

The "*Absolute*." At page 33, Mr. Mansel writes:—

"The almost unanimous voice of philosophy, in pronouncing *that the Absolute is both 'one' and 'simple,'* must be accepted as the voice of reason also, so far as reason has any voice in the matter."

Very well; then—if we suppose the absence or non-existence of all bodies—*Space* is "one" and "simple." It is known to us only as a "single," "unlimited," "Infinite" entity—"extension."

I think I may safely say, then, that in "Space" we have a distinct and clear conception of an Infinite-Absolute; "Space" having no *necessary relation* to any other Being or existence. Indeed, how can it—seeing there *is* no "other" Being?

Any limit or end of space, or any beginning to exist, or any ceasing to exist of space being inconceivable, space answers Mr. Mansel's "definition" of the Infinite-Absolute.

There is thus no difficulty in arriving at a satisfactory idea of an Infinite-Absolute. Space cannot be divided—for we cannot get outside of it. It cannot be compressed—for being endless in all directions, we cannot get outside of it either to "divide" or to "compress" it. It cannot be "extended," for it has no "bounds" to be extended. It has no *necessary* "relation" to anything else, for there is nothing else to be related to.

It is, no doubt, very easy to get a satisfactory idea of the Infinite-Absolute, by supposing the non-existence of everything but space; but then, although we are able to *suppose* them to be non-existent, still they *do* exist, and the moment we recognise their existence, our "Infinite-Absolute" disappears, and our difficulty remains as before. Still, to be

able to "*think*," an Absolute-Infinite is something gained. It is not an absolutely inconceivable conception, like that of a round square; we *can* think the Infinite, and we *do* know "things." But how can we conceive the "Infinite" and the "things" *co-existing*—existing together?

And yet, I think, a solution of the difficulty is "conceivable." If it could be shown that space and some other entity *could exist together in the same place at the same time*, the whole contradiction would disappear. Does any such instance exist? Can any such instance be discovered?

It is very curious that everybody continually assumes such instances. We always speak of a body "occupying" space, as if the space was always there ready to *be* occupied, and remained there after ceasing to be occupied. We seem to take it for granted that the total of things consists of Infinite space "plus" things existing in space—occupying space,—like the half-dozen fishes in the glass cube which was completely filled with water; which cube we supposed to *remain full* if all the fishes were removed. If we suppose a power to be present in the water, which could produce fishes in the water, without needing to reduce the quantity of the water to make "room" for them, the water—by *itself—void of fishes*, would represent the Infinite. The "production" of the fishes by some "power" present in the water would be "creation." The fishes would be the Finite, the water the Infinite, and the "Infinite" and the "Finite" would exist "together." The "creation" of the "Finite"—the fishes—would not reduce the Infinite—the water—to a Finite, for if all the fishes were annihilated the cube would still be full.

I have given my reasons for believing that what we call atoms consist of groups of Powers, and that what we call Forces are but the expression of these Powers in action; that the Powers are not always in action, but need some force external to themselves to initiate action—except gravity, the action of which is constant, and consequently

never needs starting. That these "Powers" are indestructible by any means known to man. But that "Forces" are destructible by opposed Forces. I call gravity, chemical attraction, chemical repulsion, cohesity, polarity or polaricity, and elasticity, and (possibly) magneticity, Powers. Leaving out magnetism, they amount to six.

We will again have recourse to the glass cube filled with water and fishes. We will "suppose" that where there is water there is not fish.

To answer to the number of "Powers," we will suppose the number of fishes to be six.

The water represents space. The fishes, which are composed of different combinations of the six powers—represent things, or atoms, or bodies.

Except by creation no "addition" could be made to the total consisting of water and the six fishes, seeing that the water and the fishes together entirely fill the cube. And we suppose—as we are obliged to do—that both space and fishes have existed eternally. To do otherwise would imply creation.

Suppose also we are curious to "know" whether—supposing there were no fishes in the cube—the cube would still be "full" of water, because if the cube was always full of water, alike in the presence and the absence of fishes, then as many fishes as we please could be introduced; whereas, if a fish could be only where there was *not* water, then to make room for an additional fish, an extent or amount of water sufficient to make room for the new fish must be removed; and if such an amount or extent of water could *not* be removed, then no new fish could be introduced.

Suppose a new fish makes its appearance.

We account for it by thinking either it has been made up of parts abstracted from the six fishes, or that it has been brought in from the outside of the cube; a sufficient quantity, or amount, or extent of water having been removed

to make room for it; only we suddenly remember that no portion of the water *can* be removed from the cube, seeing that the water and the fishes together stand for Infinity. Therefore it *must* have originated *inside* the cube, *somehow—for there it is.*

One thing is certain. It must have originated within the cube. If it is only a *re-arrangement* of the substance of the six fishes, then there is no "addition" to the "contents" of the cube, and its appearance throws no light on the question—whether where there is fish there is also water, or only water, or only fish.

If the new fish is not a re-arrangement of the substances composing the six fishes, and if water cannot be removed out of the cube to make room for it, then there must—seeing a re-arrangement of the six fishes failed to account for it, and seeing the quantity of water cannot be made less—*there must be some power present in the water to produce it,* and where the new fish is there must be *also* water, and if there is water where the new fish is there must be water where the other fishes are. *But even if there is not, there most certainly is water where the "new" fish is.* And an "addition" has been made to the total sum of fishes; but "no addition" has been made to the quantity of water.

The "water" is "space."

The "new" fish is—"Life"—for Life is a *new power,* not a mere re-arrangement of powers or things already existing.

Before Life appeared the sum of things must necessarily have constituted a *plenum.* There could have been no "vacancy"—no vacant "place" where there was "nothing" waiting to be filled up by that new "something"—Life. The cube being already entirely filled with water and fishes, a new fish could be introduced *only on one condition*—that it could exist in a place already full of water or full of a fish;—*that two things could exist in the same place at the same time.*

I think I have previously shown that Force is certainly destructible. Forces are "produced" in already existing space. Space is not destroyed to make room for them, and brought again into existence to fill the place temporarily "occupied" by the destroyed Force. *Force and space existed in the same place at the same time.* And I think the result of *chemical union* is the occupation by *Powers* or *bodies* of the same place at the same time. Body is not what we call material, but spiritual; and, I think, that when chemical union takes place bodies "interpenetrate" each other. But I do not insist upon such "interpenetration." It is sufficient for my argument that space and Forces can exist in the same place at the same time to warrant us in believing that Powers and space can also exist in the same place at the same time. For we have seen that in the form of "Life" a *new "power" has begun to exist in space.*

In relation to this opinion let us consider the phenomena of "gravity."

In the hands of Newton the doctrine of gravitation assumed its final form, which is—

Every portion of matter attracts every other portion of matter, and the stress between them is proportional to the product of their masses divided by the square of their distance.

That two homogeneous spheres of matter act as if the whole of the masses were concentrated at their centres.

The mutual gravity of two bodies is entirely unaffected by the presence of other gravitating bodies.

All objects fall with equal rapidity.

In the chapter on "Ultimate Scientific Ideas," Mr. Spencer says:—

"I lift from the ground and continue to hold a pound weight. . . . The whole earth, as well as each individual of the infinity of particles composing the earth, acts on the pound in exactly the same way, *whatever intervenes, or if nothing intervenes.* Through eight thousand miles of the

earth's substance, each molecule at the Antipodes affects each molecule of the weight I hold, in utter indifference to the 'fulness' or 'emptiness' of the space between them, so that each portion of matter in its dealings with remote portions, *treats all intervening portions as though they did not exist;* and yet, at the same time it recognises their existence with scrupulous exactness in its direct dealings with them. We have to regard gravitation as a force to which everything in the universe is at once *perfectly 'opaque'* in respect of *'itself,'* and *perfectly 'transparent'* in respect of *'other'* things."

Professor Jevons, in "The Principles of Science" (page 514), speaks thus of gravity:—

"Gravity is a force which appears to act between bodies through vacuous space; *it is in positive contradiction to the old dictum that nothing can act but through some medium.* It is even more puzzling that the force acts *in perfect indifference to intervening obstacles.* 'Light,' in spite of its extreme velocity, shows much respect to matter, for it is almost instantaneously stopped by opaque substances, and to a considerable extent absorbed and deflected by transparent ones. *But to gravity all media are, as it were, absolutely transparent, nay, non-existent,* and two particles at opposite sides of the earth affect each other as if the globe were not between; *the action is, so far as we can observe, 'instantaneous,' so that every particle of the universe is at every moment in separate cognisance, as it were, of the relative position of every other particle throughout the universe at that 'same' 'moment' of 'time.'* Compared with such incomprehensible conditions the theory of vortices deals with commonplace realities. Newton's celebrated saying, *'hypotheses non fingo,'* bears the appearance of irony; and it was not without apparent grounds that Leibnitz and the continental philosophers charged Newton with re-introducing occult powers and qualities."

At page 605.—"The gravity of a body, again, appears to be *entirely independent of its other physical conditions,* being

totally unaffected by any alteration in the temperature, density, electric or magnetic condition, or other physical properties of the substance."

That is, it is a "Power" which seems to "pervade" all *things, to be present everywhere,* to subsist *at the same time in all matter and in all space, to subsist in all things the same as if no other force or power existed, to inhabit all bodies, molecules, particles, atoms, at the same time as all other powers inhabit them.* A Power and Force of which no atom can be deprived. A Power and Force into which no other Power or Force can be changed, though gravific force can itself be changed into other forces—as heat, for instance. Chemical affinity, heat, light, elasticity, cohesion, electricity, magnetism, polaricity, none of them can be changed into gravity. In vain did Faraday, the greatest chemist of modern times, bring to bear all the resources of his genius—of his wonderful imagination and exhaustive knowledge—in the attempt to "correlate" gravity with the other forces. To use his own words, "the result was—*nil.*"

Here then we have a Power and Force which *co-exists in the same place and at the same time with all Bodies and their Forces, and with space as well;* which I think amounts to a direct "*Proof*" that space is absolutely Infinite, and that the presence or absence of things makes no difference in its Infinity.

It is no wonder that space is so wonderful,—that we cannot think of it as non-existent, as having beginning, or end, or middle, or side, or limit; that it should be at once perceivable and unperceivable, unknowable and knowable—knowable as "different" from all things, as "containing" all things; that without it we cannot even *suppose* any other existence; as that which not only "contains" all things, but produces, "creates" all things—have we not seen a *new Power*—the power of "*Life*" emerge from it—for Space—I tremble while I write the words—is—God.

God—Omnipresent, for Space is Infinite, and pervades all

things. Infinite, for Space has no beginning, no end. Eternal, for its beginning or its ending are alike inconceivable. *In* all things, *through* all things, *creating* all things, *containing* all things, and yet, wonder of wonders, marvel of marvels, *different* from all things. Not an "anthropomorphic" Being, not a "magnified man," but a Being so inconceivably wonderful, that while he exists in our very presence, and with whom—in and through our very selves—every atom of us is in direct and unchangeable contact, we yet—"know" him not! *Space is the mode in which the Infinite God manifests himself to us*, and enables us to understand *How* it is that *in* him we can "*Live*" and "*Move*" and *Have* our *Being*. How the Finite can "*co-exist*" with the Infinite, and the Infinite *remain* Infinite. How additions can be made to the sum of things, and the Infinite be Infinite as before.

If I am right the difficulties propounded by Mr. Mansel ought not to be difficult of solution.

At page 30, "Limits of Religious Thought," Mr. Mansel writes:—

"The metaphysical representation of the Deity as Absolute and Infinite must necessarily, as the profoundest metaphysicians have acknowledged, amount to nothing less than the sum of all reality. [*That* would be "Pantheism."] 'What kind of an absolute Being is that," says Hegel, 'which does not contain within itself all that is actual, even evil included?' [Yes—"contain," but not itself *be what* it "contains."] We may repudiate the conclusion with indignation, but the reasoning is unassailable. If the Absolute and Infinite is an object of human conception at all, this, and none other, is the conception required. That which is conceived as Absolute and Infinite *must be conceived as 'containing' within itself the sum, not only of all actual, but of all possible modes of being.* For if any actual mode can be denied of it, it is 'related' to that mode, and 'limited' by it; and if any possible mode can be denied to it, it is

capable of becoming 'more' than it now is, and such a capability is a 'limitation.'"

According to the idea I have expressed in relation to Space, Space-or — — — God — — — is Infinite and Absolute before creating. Creation—seeing that space and things can exist together in the same place at the same time "*adds*" *nothing* to the Infinite—"*takes*" *nothing away* from it. Under all circumstances it remains the same. The presence of created things or their absence does not in any way whatever affect it. While it "contains all things," it is the same as when there was nothing but itself. But it is not the "sum of all reality." It only "contains *within* itself all possible modes of being "and" all actual modes of being—evil included," but the (attempted) solution of the existence of "evil" in "God"—for all things "exist" in God—has to be by-and-bye considered when we come to the question—Why does man exist? But though all things exist in God, they are not therefore portions, or elements—how shall I express it?—of God. They co-exist in the same place, but they are not identical with God, whose Infinity is not affected by that which he creates—that is, causes to be. Which brings us to the "First Cause."

Mr. Mansel continues (page 31):—

"But these three conceptions—the Cause, the Absolute, the Infinite, all equally indispensable, do they not imply contradiction to each other, when viewed as attributes of one and the same Being? A Cause cannot as such be Absolute. The Absolute cannot, as such, be a Cause. The Cause, as such, exists only in *relation* to its effect; the cause is a cause of the effect; the effect is an effect of the cause. On the other hand, the conception of the Absolute implies a 'possible' existence *out of all* 'relation.'"

According to the principle I have stated, the Absolute at one and the same time exists *out* of all relation, as Infinite-Absolute, irrespective of the existence of anything it has "caused" or "created," and *in* relation to that which it has

caused or created, for both creator and created, Infinite and Finite, exist together in what I can only term the same place and at the same time, whereby the created does not "limit" the creator, who is Infinite as before, but as space—or God—"pervades" things, things and space are in "relation" to each other—each being *in* the other, and yet *not the same* as the other; and thus "we can conceive the Infinite and the Finite co-existing together." Instead of being obliged—since "we cannot have both together"—to "take the one," and "leave the other," we *can*—since space and things co-exist in the same place at the same time—take both "*together;*" and the "contradiction," which seemed to be insoluble, vanishes.

"But these three conceptions," says Mr. Mansel—"The Cause, the Absolute, and the Infinite, all equally indispensable, do they not imply 'contradiction' to each other, when viewed in conjunction as attributes of one and the same Being."

We now, I hope, understand clearly the meaning of the word Infinite; and we understand clearly, I hope, what we *mean* by the word Absolute. We mean that in the Infinite we can *perceive no differences whatever*. God manifests himself to us as space; which to us seems absolutely simple, for in it we can distinguish no differences. To us, therefore, it is simple, unmixed, absolute. But these are names not expressing "knowledge," but rather "ignorance." Out of that seeming "simple," "absolute" "space"—come all things. Whatever in the future we may come to know of it, at present we know it only as Infinite Extension; that *in* it must be present all that was needed to produce the total of things such as we know them; but for us to say that it not only *appears* to us as simple, unmixed, absolute, but that it *is* what we mean by those words would be the extreme of folly. All we can say of its "nature"—or "constitution"—I feel how inexpressibly foolish it is to use such words in relation to God—and I use them only to repudiate them in such relationship—is, that they are for us words

almost without meaning; and—unless our mental powers should in any future remaining to us receive such additions or attain to such development as is at present inconceivable to us—must be limited to the belief that God is Infinite, and has created all things, and that all things exist *in* him, and by him. For us, Mr. Mansel's "difficulties" and "contradictions" do not exist.

Mr. Mansel continues:—

"A Cause cannot, as such, be Absolute; the Absolute cannot, as such, be a Cause. The cause, as such, exists only in relation to the effect. [A "Cause" is the "name" of an "act," and the act exists only in relation to the actor, and the effect of the act. But the 'Actor' or 'Cause'—which here means 'Creator'—*exists whether He acts or not.* The effect is, of course, the effect of the act—of the actor, and exists in relation to the actor; or, as Mr. Mansel puts it, as if it were a difficulty]—the Cause, as such [that is the "act" of the actor, which constitutes the cause] exists only in relation to the effect; the cause [the act of the actor] is a [the] cause of the effect; the effect an [the] effect of the act of the actor, *whose "existence" does not depend upon "acting,"* while causation and effectuation alike depend upon his action.

"Cause" and "effect" constitute an "oppositional conception" or "thought" about an "*act.*" Causation and effectuation cannot occur otherwise than simultaneously. A cause cannot occur *before* the effect occurs, else it would be a cause destitute of effect—which is nonsense. An effect cannot occur *before* its cause—that would also be nonsense; yet we seem to think of the "cause" as being antecedent to the effect, and the "effect" as successive to the cause. The fact being, that *that* which *when it acts* will be the cause of an effect, necessarily must *exist before it acts*, but is not a "cause" *until it acts.* But as we know when we speak of a caused effect, that that which caused the effect must have existed previous to *causing*, we are apt to think of it as not only previously existing, but

we are apt to attribute to it "causation" *before* it causes; in short, we speak of it as cause irrespective of the act of "causing." There is no gap between causation and effectuation, but they are, like all other pairs of opposites constituting thoughts, only apparently separated, not really separated, but only distinguishable by a "point" of time, which, like the "point" of physics, has neither length nor breadth; they begin simultaneously. Also, the cause of an effect seems to cease, while the effect visibly continues. But this is a mistake. So long as an effect can be attributed to a given cause, so long as that effect continues, the *cause is still in action*. But this we are apt to forget. If I communicate to a billiard ball such an amount of force as shall cause it to move ten feet, I am the cause of that effect or motion till the motion ceases, for my force acts so long as it exists.

Cause and effect occur simultaneously, and yet they occur in succession; but *there is no gap of time between them*. It is only in *thought* they can be considered as antecedent and consequent; for antecedent and consequent are "*a*" "thought."

Cause and effect are the respective opposites of a *thought about an act*. Before and after—subject and object—have no other existence but as acts of thinking.

Mr. Mansel continues (page 31):—

"On the other hand, the conception of the Absolute implies a possible existence *out* of *all* '*relation*' [already quoted and commented upon]. We attempt to escape from this apparent contradiction by introducing the idea of succession in time. The Absolute exists first by itself, and afterwards becomes a Cause. But here we are checked by the third conception, that of the Infinite. How can the Infinite become that which it was not from the first?"

We can make no assertion as to the *ultimate nature of the infinite God*. The Infinite does not "become" anything, but continues to be that which it was before creation. We have seen that creation—seeing that more than one thing

can exist in the same place at the same time is conceivable, as not *adding* anything to the Infinite.

"If causation is a possible mode of existence, that which exists without causing is not infinite; that which becomes a cause has passed beyond its former limits."

All which, being founded upon the erroneous supposition that creation must *add* to the Infinite, and as addition to the Infinite is inconceivable, creation is impossible—as involving a contradiction,—we have shown to be erroneous.

Mr. Mansel proceeds to reason as to the consciousness or unconsciousness of the Absolute. Having been compelled to believe in an Infinite Creator, we recognise the Infinite as present to us only as Infinite Extension. We are compelled, since Life comes out of Infinite Extension, to recognise Infinite Extension as the Creator of the universe. But we are wholly unable to predicate of that Creator anything beyond *Infinite existence, possessing power to create the universe*, beyond that we cannot go. We cannot know, or even guess, what it can, or what it cannot do, other than that it is Infinite existence, possessing power to create the universe.

Mr. Mansel proceeds:—

"Supposing the Absolute [the Infinite] to become a Cause, it will follow that it operates by 'means' of 'free-will' and 'consciousness.' [Free-will is for us an unsolved problem, and consciousness is a state; it can be a "condition" of action, but not a "means."] . . . The act of causation must therefore be voluntary, and volition is only possible to a conscious being. But consciousness again is only conceivable as a relation. There must be a conscious subject, and an object of which he is conscious. The subject is a subject to the object, the object is an object to the subject, and neither can exist by itself as the Absolute."

Wrong. A stone is an "object" to "me," but "I" am not an "object" to the "stone." For subject-object and object-subject are thoughts, and a stone cannot think. But two

beings capable of conceiving that "opposition" which we call "subject" and "object" may each be "object" to the other and "subject" to himself. If I, in thought, oppose myself to another man, I am a "subject." If, at the same moment, another man opposes me to himself, then I am an "object" to *him*. I am thus, at the *same time*, a "subject" and an "object," which sounds absurd. It is not so however; for subject and object are simply the pair of opposites constituting a mental conception, which has no other existence except as a thought—which is an act of a mind.

Mr. Mansel says, "But consciousness is only conceivable as a relation," which is inaccurate. Consciousness is a state, not a relation. It is consciousness *of* a relation, not *a* relation. If my belief be a true belief, then God, though Infinite, *is in relation to all things*, for all things exist *in him*. The Infinite is opposed to, or different from, all finites. God must know all things at once—must be conscious of all things at once—must, as it seems to us, be conscious in some way similar to that in which *we* are conscious and in a way utterly transcending human consciousness. The highest act of the living creature is "thinking." But if we suppose all "created" things non-existent, and God alone existent, then to try to think what God is, and how he knows, or what he knows, is useless. Mr. Mansel says, "The subject is a subject to the object; the object is an object to the subject; and neither can exist by itself as the Absolute." If we take God himself to be the subject, and the universe as the object, what Mr. Mansel asserts is true only of the object—the universe; but it is not true of God who *can* exist *by himself* as the Infinite. For he existed before there *was* any universe or "object." Mr. Mansel throughout this part of his argument implicitly speaks only of such consciousness as is possible to *man*, which I have shown is also possible to God. To God, apart from the existent universe, I cannot apply "consciousness" or "knowledge." All we can say is, that as Infinite Space

is greater than and different from the Finite Universe which it contains, so God must be Infinitely greater than and different from the Finite Universe which he has created.

At page 38, Mr. Mansel sums up:—

"The conception of the Absolute and Infinite, from whatever side we view it, appears encompassed with contradictions. There is a contradiction in supposing such an object to exist, whether alone or in conjunction with others; and there is a contradiction in supposing it not to exist.

"There is a contradiction in conceiving it as one; and there is a contradiction in conceiving it as many.

"There is a contradiction in conceiving it as personal; and there is a contradiction in conceiving it as im-personal.

"It cannot, without contradiction, be represented as active; nor, without equal contradiction, be represented as inactive.

"It cannot be conceived as the sum of all existence; nor yet can it be conceived as a part of that sum."

At page 35:—"The whole of this 'web' of 'contradictions' (and it might be extended, if necessary, to a far greater length) is woven from one original warp and woof, namely, *the 'impossibility' of conceiving the co-existence of the infinite and the finite, and the cognate 'impossibility' of conceiving a 'first commencement' of phenomena, or the 'Absolute' giving birth to the 'Relative.'*"

Are these "contradictions" real, or only seeming?

Mr. Mansel says:—

"There is a contradiction in supposing such an object [the Absolute and Infinite] to exist, whether alone or in conjunction with others; and there is a contradiction in supposing it not to exist."

Seeing that the "Infinite" and "Finites" can and do exist in the same place at the same time, and that "Finites" were "created" by the "Infinite," there is no "contradiction" in "supposing" God to exist "alone"—alone, that is, so far as what we call "Finites" are concerned, or "in conjunction with them."

There is also no contradiction in supposing the "Infinite" *not to exist*. We have seen that "Panism" may with perfect reason assert that there is no "the Infinite," but only "Infinity," which may consist of eternally existing Space and things, to which together there can be no bounds, there being always and everywhere either Space or things; and of any "beginning" to exist of either Space or things, Panism asserts we have no evidence.

We have been obliged to reject that opinion, because the coming into existence of the new "Power" we call "Life" could not be accounted for except on the hypothesis of a Creator, for a thing cannot create itself; and as there can be no "no place" in which the "new power" could exist, we had no choice but to believe that a plurality of "powers" *must* be able to exist in the same place at the same time; of which we have, in the case of gravity, an absolute proof—a proof which rendered the "possibility" of the co-existence of the Infinite and Finites in the same place at the same time, not only "believable," but a "necessity."

Mr. Mansel continues:—

"There is a contradiction in conceiving it as 'One.' Not so. As Infinite Space—which we conclude to be God's 'manifestation' of himself to us—is presented to us under only one, unlimited, un-finite, Infinite aspect, we have no choice but to perceive and think of it as 'One;' which does not give rise to any 'contradiction' whatever.

"And there is a contradiction in conceiving it as 'many.'"

But we do not conceive it as "many," but as "One"—the "One" which "contains" the "many"—which has "created" the "many," and as the "One" and the "many" can exist in the same place at the same time, the "creation" of the many by the one does not "limit" the one.

"There is a contradiction in conceiving it as 'personal;' and there is a contradiction in conceiving it as 'impersonal.'"

Not so. As the "Infinite" existing *before* creating, we

think of God as "impersonal." When we think of the Infinite as creating, and as co-existing with, and containing all Finites, as pervading and being present in all Finites, yet differing from all Finites, we think of God as "personal"—that is, as the Infinite conscious entity, different from all conscious and unconscious Finite entities; and in so doing we fall into no contradictions.

"It cannot, without contradiction, be considered as active; nor, without equal contradiction, be represented as inactive."

Not so. We see that it has been "active" in "creating" the new power—Life. Between the creation of the other six powers and the creation of the new Power Life, we see that, so far as our earth—and probably the whole of the solar system is concerned—it has been "inactive," unless it be "active" in the souls of men. For if God contains all things, and is present in all things, and consequently in the soul of man,—communication "with" him and inspiration "from" him are perfectly conceivable. St. Paul says, "That they [men] should *seek* the Lord, if haply they might *feel* after him and *find* him, though he be not far from every one of us; for in him we live, and move, and have our being."

I think the latter words express what I think we may call *scientific truth*, for our bodies are indeed the "temples of God." God is not only "not far from every one of us," but IN HIM we scientifically—physically—intellectually—metaphysically—morally—"Live, and Move, and Have our Being." We are apt, even while we speak of God as Infinite, to think of him as being afar off, that when we pray to him our prayers have to ascend to him to some inconceivable elevation—to some inconceivable distance. We never seem to realise that we are, and cannot but be, in actual contact—actual touch with him; but such words feebly express the reality, for God is in and through all things, not only the human soul, but all, all, all things; there is no thing—no place in which he is not.

Thus, to think of God as "active," involves no "contradiction;" neither does it involve any "contradiction" to think of him as "in"-"active."

"It cannot be conceived as the *sum* of all existence; nor yet can it be conceived as a *part* of that sum."

Not so. Mr. Mansel imagines there is only *one* form of existence. There are *two*. The Infinite existence—God; and the sum of Finite existences created by him, which we call the universe; which exists in the same place at the same time, with God and in God; but is, nevertheless, wholly and entirely different from God. To create Finites makes no "addition" to the Infinite God. To annihilate all Finites would make Infinite God "no less." To conceive God as alone then gives rise to no "contradiction." To conceive God creating Finites—co-existing with them—containing them gives rise to no "contradiction."

"A contradiction thus thorough-going, while it sufficiently shows the impotence of human reason as an *à priori* judge of all truth, yet is not in itself inconsistent with any form of religious belief."

The contradiction "thus thorough-going," being found to be baseless, shows that truth cannot be reached by the *à priori* metaphysical method alone, but that our search for truth must start, not from unproved and imaginary metaphysical necessities of thought, but from concrete facts presented in experience; that before we deal with "necessities of thought" we must know something, not only of the fundamental necessities, but of the fundamental and ultimate "facts" of "things" as well as of "thought." We must have learnt that any true philosophy, though not wholly founded upon physics, must not be in contradiction to physics. But when it happens that philosophy and physics disagree we are not at once to take it for granted that it *must* be philosophy which is in the wrong; but submit *both* to as careful and as complete an examination as is possible to us, and abide by the result—whatever it may be.

It seems to me that as "careful" and as "complete" an examination as I am able to make of the ultimate facts of philosophy and science, tends to show that the "web of contradictions" set forth by Mr. Mansel has no real existence; and that it is "possible" to conceive the co-existence of the Infinite with Finites; that it is "possible" to conceive a first commencement of phenomena, that it is "possible" to conceive the Absolute giving birth, not to the Relative, for there is no such thing as "*the* Relative," but for the Absolute to give birth to Finites between which and the Absolute, "relations" are conceivable.

Before replying to the question with which we started—the question, "Whence comes man; from "Nature," or from "God?" we must, I think, state what man is.

As it seems to me, man is the highest development of the "Power" called "Life"—a Power added, at a comparatively late period of geological time, to Powers already existing.

To the question, then—"Whence comes man; does he come from Nature, or from God?" we must, I think, reply—

That not only man but, Nature also, owe their existence to the Infinite Eternal Being—GOD, who "created" all things.

Supposing these answers to be accepted, other questions suggest themselves. We want to know why man exists? We want to know why God "created" him? Did God desire that man should be good? Is there any reason why he *should* be good. If there be, then, why does evil exist? And there arises also the further question—that supposing there be a good reason why man should be "good," and if it is desirable that man *should* be good, is goodness "possible" to him? If his "character" be made *for* him, not *by* him, how *can* he be good, if his character, which he did not make himself, be not good? Does his existence terminate at death? Does he come into the world only for the sake of what he therein does—suffers—enjoys? or, is his existence continued after death? Is that existence, if it *be* "continued after death,"

to be desired or to be dreaded? Is the having been born a misfortune or a blessing? What is the character of God? Is he a Being to be feared—to be hated—or to be loved? What are man's relations to his fellow-man? What are man's relations to God?—that awful Being whose power over us we see to be absolute; and that last, most terrible of all questions—Is man's existence owing to God's malevolence—to His indifference—or to His Love?

[TO BE CONTINUED,—PERHAPS.]

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